

Audubon

JANUARY-FEBRUARY 1961

Magazine

ONE DOLLAR

PUBLISHED BY THE NATIONAL AUDUBON SOCIETY



EMERALD KINGDOM page 25

WELDON F. HEALD, writer, photographer and conservationist for over thirty years, has written more than 400 articles on travel, history and nature. "High Sierra—Mountain Wonderland", his newest book, is authored in collaboration with Joseph Wampler. Mr. Heald is a member of numerous organizations related to nature study, mountain climbing, exploration and conservation. During World War II he served in the Army as climatic specialist and afterwards as consultant on climatology and world geography in the Defense Department. An avid explorer of the forests, mountains and deserts of the Far West, he and his wife Phyllis live in Tucson and annually co-direct the Southwest Writers Workshop and Conference at Arizona State College.



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Audubon magazine

Volume 63, Number 1, Formerly BIRD-LORE

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A bimonthly devoted to the conservation of wildlife, plants, soil, and water

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Letters

Red-shouldered Hawk at Feeding Station

On December 7, 1959, the feeding station on our 80 Indiana acres was visited by a young red-shouldered hawk. While watching birds at the feeder from a window of the cabin which sits behind a walnut grove, we noticed the hawk perched in a walnut tree. From there it drifted down several times to pick insects from the ground. Then it flew directly to the open feeder and sat there eating the frozen mixture of beef fat, peanut butter, and rolled oats. A mockingbird hovered above the hawk and attacked it repeatedly by giving it a quick peck on the rump, but red-shoulder only gave the pugnacious smaller bird a disdainful look and continued eating.

In the meantime black-capped chickadees fluttered nearby, tufted titmice scolded noisily, field sparrows fed on the ground only a few feet away, and the grove was filled with the usual chatter of birds. None of them, except the mockingbird, seemed perturbed by the young hawk. This is a notable contrast to their behavior on the day a sharp-shinned hawk flew through the grove in pursuit of a mourning dove. At this time all the birds took cover and not one was seen or heard for several minutes after the dove and hawk had passed. Red-shoulder ate from the feeder for about 30 minutes, then arose gracefully, sailed from the grove and over the hills out of sight.

We have often seen red-shouldered hawks gliding on the air currents over our fields, and have even watched an adult bird catch and eat a field mouse, but this was the only time we had seen one at the feeding station.

Mrs. EUGENE P. STOCKS
Evansville, Indiana

More Approval of "Nature and Man"

May I commend you for the fine article, "Nature and Man: The Two Faces of Management," by Daniel McKinley, published in the May-June 1960 issue of *Audubon Magazine*. This provocative article deserves wide distribution and study. It is splendid that you printed it.

Mrs. MILDRED HATCH
St. Johnsbury, Vermont

Editor's Comment

Reprints of Mr. McKinley's article are available from the Service Department of the National Audubon Society.

Continued on page 5



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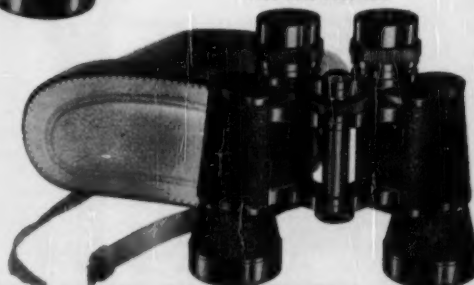


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Farewell to a Good Editor

LOOK beneath the table of contents on page one of this magazine. Although you will see his name there in small type, the contributions made by John K. Terres to the work of the National Audubon Society have not been small. This will be the last issue of *Audubon Magazine* to bear his name as editor. He has resigned, effective January 1, to go to Chapel Hill, North Carolina, where he plans to resume his former career as free-lance writer in natural history and conservation. With him go our very best wishes. We hope the two new books he has contracted to write for the J. B. Lippincott Company during the next year turn out to be best sellers! The books he has written are doing very well.

Besides his work in editing *Audubon Magazine* and encouraging and helping to develop beginning writers, John has helped the Society deal with many conservation problems through his training and experience as a professional biologist. He was

instrumental in getting the management of the Empire State Building to turn off the brilliant lights atop the building during the fall and spring bird migrations. This has averted large losses of birds that might have been blinded by the lights and dashed to destruction.

A major conservation achievement followed his article, "The Story of Island Beach," published in the January-February 1952 issue of *Audubon Magazine*. Conservationists believe this article was influential in saving Island Beach from destruction by real estate developers. It is now a protected New Jersey state park.

His work with children during his 11 years with the magazine, encouraging them in their interests in natural history and wildlife conservation, is well-known to our readers. His voluminous correspondence with scientists, conservationists, and people with an interest in wildlife all over the world, has helped establish warm relations for the Society everywhere.

John's own ever-searching curiosity and his encyclopedic knowledge of nature have combined with his literary skill to make him a good editor. He will be greatly missed on the staff of the National Audubon Society. But we are happy that his discerning eye and talented pen will continue to illuminate the mysteries of nature and chart the course of conservation for many readers in the years to come.

—CARL W. BUCHHEISTER
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John K. Terres. Photograph by Marion Terres.



How Do Bats Catch Their Food?

Just a few comments on *Audubon Magazine*, July-August 1960 issue, p. 152. Mrs. Emma Davis of Weston, Missouri, notes starlings roosting on a chimney. The same happens on a church chimney across the street; not only starlings, but pigeons and English sparrows. However, the starlings will force the others to leave. Also, it is a perching place for the starlings all year long.

On page 158 of the same issue, photograph, upper left, the caption says insects are caught in pocket formed by the tail membrane. The *Encyclopaedia Britannica* does not mention this, nor does "The Field Guide to the Mammals," by Burt and Grossenheider, nor Ralph S. Palmer in "The Mammal Guide."

This summer I found a bat (probably a little brown) impaled on a barbed wire fence between the radius and fifth metacarpal bones of one of its wings. I would guess it to have been there a week, for it was hot and dry and the body was desiccated rather than putrefied.

LOUIS P. PUSHKARSKY

Trenton, Missouri

Editor's Comment

Our authority for the statement that the interfemoral membrane of bats is sometimes used to capture insects is, first, the well-known mammalogist, Victor H. Cahalane, who writes (p. 129 of "Mammals of North America"), "Sometimes they (bats) catch their meals in their mouths, sometimes in their tail membrane."

Also, Dr. Glover M. Allen, another mammalogist, in his book, "Bats," (published by Harvard University Press in 1939 and long since out of print) writes, p. 79:

"In many insectivorous bats . . . such as the small brown *Myotis*, *Eptesicus*,

and others, the tail membrane plays an important part in the capture of prey in flight. . . ."

We know of no other proof of this statement, but in spite of the view of the authoritativeness of the two men who made these assertions, it may be a disputed point until more is learned about it. Dr. Donald R. Griffin, possibly the world's authority on bats, seems to indicate in his book about bats, "Listening in the Dark," (Yale University Press, New Haven, Connecticut, 1958) that most if not all insects may be caught in the mouths of bats excepting the very largest ones.

THE END

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See page 15

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CARL W. BUCHHEISTER
President

November 1960

JAY N. DARLING RECEIVES AUDUBON MEDAL

During the 56th Annual Convention of the National Audubon Society held in New York City, October 29 to November 1, 1960, the Audubon Medal was awarded to Jay N. Darling, cartoonist and former Chief, U.S. Biological Survey, Washington, D.C.

The presentation was made by Carl W. Buchheister, President of the National Audubon Society, at the Annual Dinner, Tuesday evening, November 1. In Mr. Darling's absence owing to illness, the medal was received by Dr. Clarence Cottam who formerly worked with Mr. Darling in government service. Dr. Cottam also read Mr. Darling's response. In making the presentation, Mr. Buchheister read the following citation to:

JAY N. (DING) DARLING

Brilliant cartoonist, journalist and speaker, forceful personality,
Unabashed crusader, sworn enemy of the wastrel and despoiler of resources,
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he strove mightily, and not without success, for unity in the cause.

Even in retirement his voice has been a whiplash, and the spur of troubled
conscience, to the conservation movement.

RESPONSE BY JAY N. DARLING
(Read in his absence by Dr. Cottam)

To the Audubon Society, your President, Carl Buchheister, and all his predecessors, to the officers and directors, and to the members who down through the years have remained faithful to the high principles on which your Society has been founded, to you all I make my most profound obeisance. You have built magnificently!

I am proud and grateful for the honor which you have conferred upon me but I can think of nothing more difficult than to make adequate reply to such a gracious compliment. I only wish I might have done more to deserve it.

You must understand my embarrassment over this disinterment of my fossilized remains. No left hind leg of a dinosaur, dug up and placed on exhibition by some ardent archaeologist, could be more surprised than I. Although I am too old to be permitted to attend and participate on this august occasion, even now I react just as keenly to the sound of new battles and new advancements in the cause of conservation as any old fire horse, now turned out to pasture, responds to the familiar sound of a fire alarm.

My memory, however, goes back to the heroic victory of the Audubon Society over the plume-hunters and their brutal commercialization of the feathered crests of American and snowy egrets. From that time on, your unrelenting struggles have been continuous for the protection of all species of birdlife, down to your recent major project: the establishment of the magnificent refuge, traditionally known as "The Corkscrew Cypress Swamp." . . . For many years I have lived intimately in its neighborhood. If any of you have not been fortunate enough to visit it and witness its great value, you may not know that not only did you save one of the last grand stands of virgin cypress from the sawmills but you created one of the safest havens and traditional habitat areas for

Jay N. (Ding) Darling receives his Audubon Medal in Des Moines, Iowa from Miss Mary Ellen Warters, President, Des Moines Audubon Society. Photograph by Des Moines Tribune.



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great flocks of roseate spoonbills, white and wood ibises, American and snowy egrets, where those threatened species needed it most. Corkscrew Cypress Forest stood directly in the path of the headlong expansion of the Florida population boom. The threat of its destruction had been a constant anxiety for years.

Repeated appeals to local pride, to state conservation agencies, and state and federal government bureaus had failed dismally. Timber cutters and their sawmills were moving in to reap the harvest of one of the few remaining stands of top-value cypress lumber. Only then, the momentum of the Audubon Society, brought to bear under the generalship of former President John Baker, came to the rescue. It stands now as a splendid monument to all your everlasting hopes and aspirations.

Let me add that it is of paramount satisfaction to know that wherever the Audubon Society has established a refuge it will be forever free from scalawag invasion by wildcat oil drillers or other commercial exploitation. That is something, alas, which cannot be said, with confidence, of millions of acres of federal wildlife refuges — yes, even of national forests and national parks — whose inviolability can be dissipated at the whim of illiterate representatives or government executives, yielding to the political pressure in search of special privilege. Thank God for the irrevocable and sure-footed policies of the Audubon Society!

I have had wide enough experience in the administration of conservation and refuge projects to know how frail is the foundation on which they rest and how easily they may be decimated by ill-starred public and political pressures. I am thinking at the moment of the lifeline of safety-island refuges along the major flight lanes of migratory waterfowl which are under constant pressure of public demand that they be opened for public shooting; the petitions to permit drilling for oil on the Kaiabab; and abuses of public domain and national forests by the grazing interests.

All too many conservation projects, under both federal and state jurisdiction, once the birthplace of my ambitions, have become the graveyard of my hopes.

I shudder when I think of where

Continued on page 20

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Illustrations by
Don R. Eckelberry



By Alexander F. Skutch*

IN March, the driest, warmest month of the year in Costa Rica, the madera negra trees planted as living fence posts around our garden shed their pinnate leaves and cover their long, slender branches with racemes of pink flowers. The rows of delicately tinted trees gladden one's vision and help him to endure the oppressive, smoky atmosphere of the last month of our short dry season, when all the farmers in the valley are clearing and planting their hilly or rocky lands in anticipation of the approaching rains. The flowering trees attract many bumblebees, and wintering Baltimore orioles add vivid patches of orange to the floral display as they probe the pea-like blossoms with sharp bills. The few orchard orioles that I have seen in this elevated valley were visiting the madera negra flowers. From time to time an enchanting creature arrives unannounced, to poise on invisible wings beside the long flower clusters.

Only a hummingbird could dart and hover with such exquisite mastery of the art of flight, but this bird's sylph-like form and long tail make it graceful beyond most members of a family renowned for delicate beauty. The immaculate snowy white of all the lower surface of its body, contrasting so prettily with the glittering green of its upper

plumage, gives the purple-capped fairy hummingbird an elegance rare even among hummingbirds. If the charming visitor happens to be a male, his forehead and crown flash metallic violet when turned toward the watcher. The more numerous females have the forehead and crown green, like the back. They are considerably longer than the males. Both sexes have short, straight, sharp-pointed bills.

The purple-capped fairies, *Heliothrix barroti*, seem to come from a distance to visit the flowering trees of *Gliricidia sepium*, for through most of the year these hummingbirds are scarce in this vicinity. Yet, oddly enough, the pink blossoms are largely ignored by the more common resident hummingbirds, including the rufous-tailed, the blue-chested, and the snowy-breasted hummingbirds. Aside from March, the blossoming time of the madera negra, I see the fairies most frequently at the beginning of the dry season in December and January, when the poró trees in our garden shed their foliage and display their scarlet flowers on leafless boughs. The poró, a species of *Erythina*, is, like the madera negra, a member of the bean family; but its flowers have a very different appearance. All of the petals are greatly reduced except the fleshy standard, which is long and slender and tightly folded lengthwise, so that it resembles the blade of a sword or a machete. Its base is surrounded by the thick, tubular calyx, which encloses the rudiments of the other petals. The compact structure of the three-inch-long, scarlet flowers

THE PURPLE-CAPPED *Fairy Hummingbird*

makes their nectar inaccessible to nearly all of the local hummingbirds; and of the numerous kinds that frequent our garden, only those with the longest straight bills and those with the shortest bills take an interest in them.

When the poró trees begin to blossom as the wet season ends, a long-billed star-throat hummingbird with flashing magenta gorget takes possession of them and fiercely assails all trespassers. The plainly attired Cuvier's hummingbirds, so abundant in the vicinity, suck the sweet fluid from the scarlet flowers when the larger star-throats are not watching. Both of these hummingbirds have bills and tongues long enough to reach the nectar by inserting their beaks into the slit along the lower edge of the flower's folded standard. But the shortness of the purple-capped fairy's bill is compensated for by its extraordinary sharpness. Hovering before the base of the flower, the fairy simply pushes its bill into the thick calyx and removes the nectar through the resulting perforation.

I was not easily convinced that, while so delicately poised in the air, the hummingbird could exert sufficient pressure to penetrate solid vegetable tissue somewhat over a twelfth-of-an-inch in thickness; but after one had been visiting the flowers, I took a long stick, knocked down a number of them, and found many of the calyxes punctured by holes hardly wider than would be made by an ordinary pin. I have watched hummingbirds of other kinds, including the white-eared hummingbird and Longuemare's hermit, suck the nectar from the flowers of various members of the mint family by forcing their bills through the bases of the long, tubu-

* Dr. Skutch is a regular contributor to *Audubon Magazine*. He is the author of the two-volume, "Life Histories of Central American Birds," illustrated by Don Eckelberry. Dr. Skutch and his wife live on a farm in the Valley of El General in southern Costa Rica.—The Editor

lar corollas while hovering beside them; but these hummingbirds penetrated tissues far thinner and more delicate than the calyx of the poró. Flower-piercers — aberrant, plainly attired highland representatives of the brilliant honeycreeper family of tropical America — regularly drink their nectar through perforations which they make in the bases of many kinds of flowers, which are held steady by a hook at the end of the short, uptilted upper mandible while the awl-like lower mandible is forced into them. And bees, as is well known, sometimes bite little holes into corollas or nectariferous spurs whose length makes the sweet

fluid difficult to reach with their tongues.

Like other hummingbirds, the fairy adds many minute insects and spiders to its diet of nectar. Possibly it extracts such solid no less than liquid nourishment from the maderas negra flowers. One morning I watched a fairy foraging at the edge of the forest beside the pasture in front of our house. Hovering before the foliage at the ends of exposed boughs, it seemed to be gathering from them objects too small for me to see. Then it darted erratically back and forth in the air above the pasture, doubtless catching minute flying creatures—a habit widespread

in the family. Finally it captured an insect large enough to be visible to me and carried it to a perch before eating it.

Late in January, years ago, I found my only nest of the purple-capped fairy. It was 30 feet above the ground in a small tree standing at the edge of a newly made clearing in the rain-forest, close beside a rivulet and a woodland trail. The nest was saddled in the elbow of a nearly horizontal twig with a slight upward bend, in the lowest tier of branches, far out from the center of the tree. In shape, the structure was a hollow sphere with the upper third, more or less, cut away to expose the central cavity. As far as I

Continued on page 23

Pink flowers lure elegant purple-capped fairy hummingbird in Costa Rica.



There was much
I didn't know about

My Friend Cally



"Cally is a female California deer mouse."

In a study of individual deer mice the author learns some new and interesting facts about their food preferences and relationships.

Photographs by the author

By Frank F. Gander*

MR. PIPSQUEAK is gone. For over two months he had been living with Cally in my small storage room, and now the delightful little mouse has disappeared. I wish that he would come back for I miss him, and I feel sure that Cally misses him, too. Cally is a female California deer mouse or white-footed mouse, *Peromyscus californicus*, the largest in size of this group in the United States. These big mice live in brushy areas and among oak trees from central California south into the northern part of Baja California. It was about 20 months ago when Cally first came to live in my storage room, and since then we have become very

good friends. Two of her three successive mates and her many broods of babies have become friendly, too, but none was quite so trusting as Cally.

Early in March of 1959 it first became evident that some small creature had moved into my storage room and was living there among my camping equipment and several boxes of left-over business forms and supplies. The chief attraction and source of nutrition was the supply of food for my feeding stations which I also keep there. The intruder must have followed a devious course to reach this place for the only opening from the outside was where a small chip had broken from a concrete block on the opposite side of the building. Once inside the walls, the little animal would have no great difficulty in making its way into the

room through a hole beside an unused plumbing fixture.

By visiting this storeroom at night and turning on the light, I had a chance to see my little tenant, and gradually we began to grow acquainted with each other. In my notes about the mouse, the first part of the name was abbreviated to Cal. and that became the animal's name. By mid-April, I realized that a less masculine name was needed for the mouse, since Cally, as I now called her, was obviously expecting young ones soon. On March 20, while searching for something in one of the stored boxes, I uncovered Cally sitting in a neatly made nest with some very young babies under her. Carefully, I lowered the cover back over her as she remained quietly in the nest.

Several times during the next few days I peeked in at the nest. Often Cally would be there with her brood, but sometimes the babies would be alone and there were but two of them. Occasionally the nest would be empty, and then the little mother might be seen running about with the babies clinging to her teats and dragging along behind her. They did not seem to interfere with her agility, and the babies seemed to show no harm from these trips even though they went bumping along with their backs down. Out in the wild, the mother mouse would thus be able to take her babies with her when she fled from any threat of danger.

When the babies were about a week old, I discovered another mouse was in the nest with Cally and her brood. As this stranger fled down into the lower part of the box, I noted that it was a male and wondered how it had found its way to Cally's secluded haven. Since many female animals are known to become unusually active as mating time draws near, quite probably Cally had gone outside to find the male, and then he had followed her when she returned to her nest.

Kolly, as this new arrival was named, soon learned from his mate that I was not to be feared, and the two of them would sit in the nest

*Mr. Gander, a naturalist of southern California, is a regular contributor to *Audubon Magazine*. Readers will remember his recent article, "Western Bluebirds in My Garden," published in our March-April 1960 issue.—The Editor

and look up at me with their bright eyes as I peeked in at them. By the first of May, the babies, too, had their bright eyes open, and in a few days they were running about by themselves.

To keep these mice from fouling the bird feed, some of it was placed in metal and glass containers with tight lids, and the large sacks were carefully folded shut each time part of their contents was removed. Never has Cally nor any of her family chewed holes in these paper sacks although they must have known from the odors that the sacks contained foods that they liked. Nor have they ever chewed at any of the packages of currants stored in this room, and they are very fond of currants.

Each day, I left a little rolled barley and a few dried currants out for the mice, and they never tried to gnaw into the sacks to get more. As the little animals became more friendly, it seemed like a good time to get pictures of them, so I found a piece of granite and a bit of dead tree limb, and brought these in to give a more natural setting for the pictures. For several days, their food was placed on the granite and soon they learned to look for it there.

"Cally came to my hand
for dried currants."



With a strobe flash, I got a number of pictures. At first the animals would start to flee at the sound of the opening of the shutter, and the flash would catch them in odd positions of flight. Soon, however, they learned that they were not harmed, and then would sit still until the flash was fired.

By the time half of May had passed Cally had become so tame that she would come up and sniff at my shoes if I stood very still. She was again heavy with young, and on May 18, this second brood was born. The change in Cally's appearance assured me of the arrival of this brood, but at first I did not know where she kept them. On the 22nd, she had moved them back into the old nest, and there were three of them this time. Seldom does a California mouse produce a larger brood than that. Sometimes both adult mice and one of the first brood would be in the nest with the babies.

These young of the first brood were now about half grown, but they were not of equal size. The larger one was much more independent than the other, and I assumed that it was a male. It and the old male might either one be away from the storage room for two or three days at a time. After June 1, I did not see the larger young one again. A few days later, the other half-grown young one left, and Kolly left at the same time and was gone for about a week.

Late in July, Cally gave birth to one young one, and then in September she produced another brood of

two. None of the young ones that Cally raised was permitted by her or her mate to make a permanent home in the storeroom. So far as I could observe, the young males were usually driven out by Kolly when Cally was in breeding condition, and then the young females would be driven out by Cally when they became attractive to the male. Kolly would always leave when one of the young females did and would be gone for from three days to a week.

Since Cally and the others were able to leave the storeroom at any time and lived there by their own choice, the thought had not occurred to me that they might be very thirsty in that arid environment. Some rodents of arid lands such as pocket mice, *Perognathus*, and kangaroo rats, *Dipodomys*, will not drink water even when they have opportunity to do so. But by chance I learned that these California mice want water. One day in early October after I had scrubbed out the birdbath in my garden, the dripping brush was hung up on the wall of my storeroom. Returning to the room a few minutes later, I was surprised to find two young mice clinging to the wall and trying to get water from that wet brush. I filled a small tin lid with water and put it on the floor of the storeroom. Soon both adults and the two young came out and drank copiously.

About a week after this I was typing at night in my small office adjoining the storeroom when I heard loud noises on the roof and around the vine-covered front of the building. There was the sound of much gnawing and scratching. The next day it was evident that a rat had invaded my storeroom, and Cally and her friends had disappeared. I soon learned that this newcomer was a wood rat and not one of the Old World rats that are such pests around cities. This was a soft-furred, bright-eyed native animal and I welcomed the opportunity to get better acquainted with it.

Each night, the wood rat would build up a pile of wooden plant labels, plastic plant ties, and other small objects just inside the door, and each day I would put them all away again. This seemed an obvious attempt to put impediments in my way so that my approach would be a noisy one, yet the obstructions

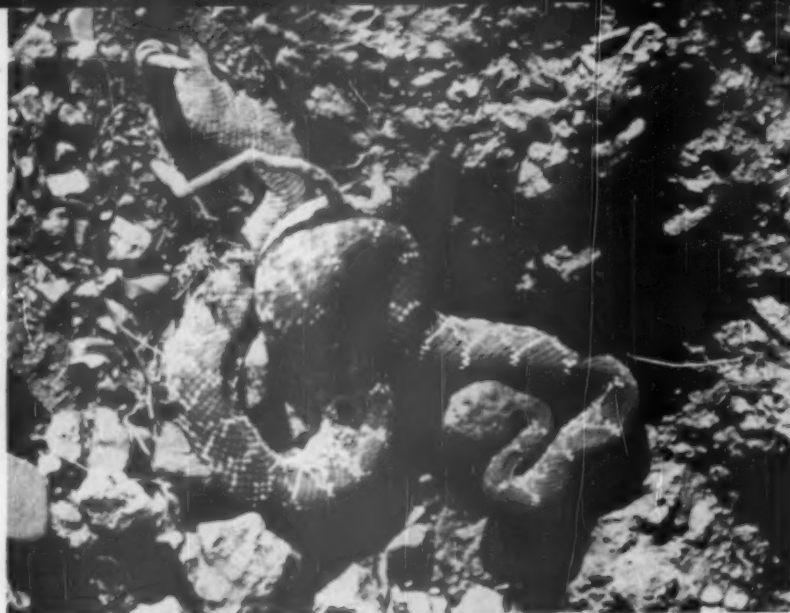
were placed there when the door was closed. This reminded me of the way some wood rats in the wild will put circles of spiny cactus joints around their nests to deter prowling carnivores.

In addition to building up a pile of objects near the door each night, the wood rat began to take things out of the boxes and scatter them about the room. It gnawed holes in the feed sacks so that the grain spilled out, and then it began to gnaw holes in the wall. That marked the end of my patience, and I decided to evict this tenant. The wood rat had not been staying in the building during the day but just visiting it at night, so I searched among the vines on the front of the building and found where the animal had gained entrance by tearing some wire screening from a ventilating opening. This was strongly repaired, and there were no more visits from it.

It was nearly Christmas when I ousted the wood rat; then soon after the first of the year, I was delighted to find that Cally had come back again. She was a little timid but soon got over that. Kolly did not come back with her, and the new male that visited her at times was very wild and would not make friends with me. He would usually be dashing for cover when I glimpsed him, but I could see that he had lost about an inch from the end of his tail. Perhaps it was this accident that had caused him to be so timid.

Cally continued to raise broods of babies and to launch the growing young ones out into the world to make room for the following brood. Then there came a period when I saw no male in the storeroom. Finally Mr. Pipsqueak appeared. He looked like an adult male, but he was no more than half the size of Cally. This made me realize that Cally was unusually large for a California mouse. Checking with the pictures made nearly a year before showed that she had grown considerably since that time.

Wishing to check further on her size, I decided to weigh Cally, so a small spring postal scale was put in the room. A few currants were put on the pan, and I knew that Cally with her keen nose would soon find them there. She went directly to the bait, and as she sat on the scale, I



"Snakes of many kinds eat mice." Red diamond rattlesnake, *Crotalus ruber*.

could see that she weighed an even two ounces. This was nearly twice the weight of 1-1/10 ounces given for this species by Sumner and Dixon in their book, "Birds and Mammals of the Sierra Nevada." As Cally had been weighed when she had young less than a week old, she was not heavy from pregnancy.

Cally was truly a matriarchal mouse and had lived a long and full life. Her large size indicated that she had been growing continuously, a condition characteristic of many reptiles but certainly not usual with mammals. She was slightly grayed about the face, but her powers of reproduction had not diminished. Her first brood fathered by Mr. Pipsqueak arrived in late June. While

these young were nursing, both parents learned to come into my hand for food. Each time I felt the dainty touch of their tiny feet I was thrilled with delight.

Currants were the bait I used for luring them into my hands as currants were their favorite among the foods I provided. They readily ate all kinds of grain—rolled oats, rolled barley, chick feed, etc.—and were also fond of bird seed. They liked sunflower seeds, but the hulls made so much litter that I saved these big seeds for special treats. They also ate kibbled dog biscuit readily.

Thinking to learn something about the diet of California mice in the wild, I began to bring in material from my garden. The mice

"Spotted skunks and my neighbors' cats also kill mice."



largely ate the fruits of elderberry, barberry, and manzanita, but the leafy parts of plants they only lightly nibbled. Remembering that many of the small mammals, lizards, and birds frequenting my garden are fond of blossoms, I offered Cally a flower from my desert willow tree, *Chilopsis*. She took this readily; then sitting up like a squirrel, she soon ate the entire blossom. Most blossoms I offered her she ate, even such exotics as petunia, geranium, and begonia from flower beds near the house. I gave a leafy spray of *Abelia* with flowers and flower buds to Cally. She held it in her forepaws and turned it this way and that as she picked out and ate the blossoms and buds. She ate none of the leaves nor leafy bracts. Her fondness for flowers strengthened my belief that unless the small animal population of my garden is unique, blossoms constitute a more important part of the diet of many creatures than is generally known.

Checking further on Cally's food preferences, I found that she would eat almost any kind of bakery goods. Cooked vegetables she refused except for boiled potatoes. While she would not eat cooked carrots, she did eat raw ones. She also ate tomato, apple, peach, grape, avocado, muskmelon, and watermelon. She ate neither lettuce nor celery I offered her, and ignored such animal proteins as fried chicken, boiled egg white, and cheese. But she did eat a mealworm and a grasshopper I gave her and I saw her catch a small moth, tear off its wings, and eat it. From this it became evident to me that California mice in the wild feed on the seeds, fruits, and blossoms of many plants, probably eat some succulent roots, tubers, and bulbs, and also eat insects.

Since these foods are available in my garden all the year around, it is obvious that the food supply is not the factor that limits the number of these mice living there. Predators that feed on rodents probably help to control the California mouse population in the area. I often hear barn owls and screech owls calling at night, and they feed heavily on mice. Snakes of many kinds eat mice whenever they can catch them. Spotted skunks and my neighbors' cats also kill mice. With so many enemies present, it is not surprising

that Cally has not been able to overpopulate the area from her safe haven in my storeroom.

But Cally does not always stay in her haven. Some night she will go out and not come back, just as her mates have done. Mr. Pipsqueak disappeared in mid-August, and Cally and one of her offspring shared the room. On August 29, two new babies were born, but no male came to live in the storeroom. By the middle of September, the babies were beginning to leave their nest and run about, and I no longer saw the older youngster from the preceding brood.

Soon the babies were able to take care of themselves, and on September 29, Cally was gone. She was still away on the 30th, and the older immature was back again. This youngster disappeared when Cally returned on the first of October. Most likely Cally had been out looking for a male, but she did not bring one back with her. I hope she found a male, and that there will be more baby mice in a nest in my storeroom. Then probably one of these young ones will be left to make its home there when Cally makes her last trip out into the night. —THE END

THE PURPLE-CAPPED FAIRY HUMMINGBIRD—Continued from page 9

could see by examining it through my field glasses, it was composed of downy materials with none of the lichens or green mosses so frequent in hummingbirds' nests.

The female was incubating, probably the two, minute, elongate, white eggs typical of the family, although these were invisible to me. She sat with both extremities of her slender body projecting well beyond the rim of her little chalice; on one side her gleaming white throat was conspicuous to the observer on the ground; on the opposite side the white under tail-coverts and lower surface of her long, tapering tail shone out. For a hummingbird, she sat very steadily. While I watched on a mild, bright morning, she incubated for 68 minutes continuously, took a recess lasting 11 minutes, then returned to sit for 56 minutes. After her next outing, which lasted only six minutes, she came with a billful of down, which she tucked inside the nest, then ran her bill over its outer surface, smoothing it. This time she incubated for only three minutes, and when she returned after 14 minutes her bill was empty.

Her departure from the nest was spectacular, for on leaving she fell into the clear space beneath the crown of the supporting tree, tail spread and wings fluttering. Sometimes she dropped only a few feet, but once she fluttered downward almost to the ground. Finally recovering herself, she flew into the adjoining forest, never over the clearing. I have seen small birds of a number of kinds leave their nests by means of a sudden drop, which apparently would be less likely than

a direct outward flight to reveal its position to an enemy which happened to have the nest in its field of vision. But when she returned, the fairy seemed to care little for secrecy; for each time she circled below the nest for a few seconds in a loose, fluttering fashion, with her gleaming white under plumage most conspicuous, then deftly settled into her cup's narrow opening. She was never accompanied by a mate.

This nest was about a mile from my farm in the Valley of El General in Costa Rica. In southern Central America, the purple-capped fairy has a long breeding season. In the "Field Book of Birds of the Panama Canal Zone," Mrs. Sturgis mentioned a nest found on Barro Colorado Island in April 1924. It was attached to the side of a vertically hanging liana. On September 8, 1956, I watched two young fairies that had not been long out of the nest, and were hatched from eggs laid probably in July. High up in roadside trees beside my farm, they rested on slender twigs and flew around each other a good deal. Often they hovered with their short bills against leaves and new shoots, from which they seemed to be plucking something, but I could not distinguish what it was. Presently their mother came and fed one of them by regurgitation while perching beside it. The youngsters resembled her but were smaller, with shorter tails. The whole top of their heads was brownish instead of green, and their backs were duller than in the adult. When she flew off, one of the young fairies followed but the other stayed behind. —THE END

CONVEN

From October 29 to November 1, 1960, inclusive, about 800 people, many of them Audubon delegates from branches and affiliates throughout the country, joined in meetings of the National Audubon Society's 56th Annual Convention. The convention ended with the annual banquet attended by more than 600 people on the evening of November 1. In the photographs on these two pages we present some of the personalities who highlighted the annual dinner.

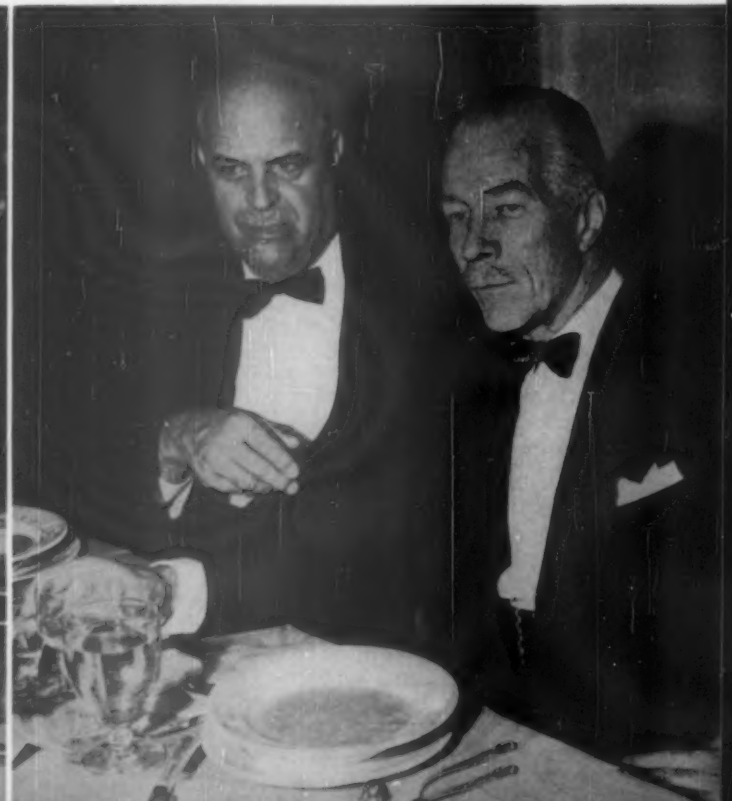


▲Dr. Clarence Cottam (left) accepts from Carl W. Buchheister, President of the National Audubon Society, the Audubon Medal. Dr. Cottam accepted the medal for Jay N. "Ding" Darling, the recipient in 1960. (See page 6)

▼Mrs. John W. Aull and Phillips B. Street, Directors of the National Audubon Society.



▼John H. Baker (left), President Emeritus of the National Audubon Society, and Colonel Walter A. Wood, President, American Geographical Society.



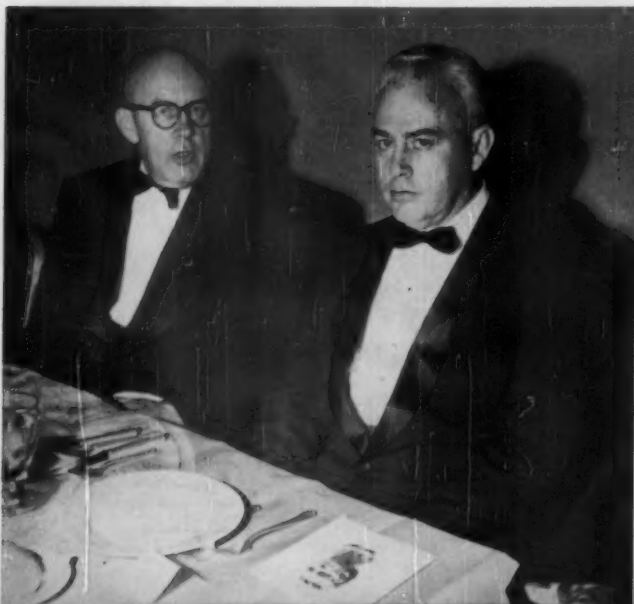
TION 1960

All photographs by John E. Hopkins

▼Robert P. Allen, retired Research Director, National Audubon Society, responds to the citation given by the Society for his 30 years of meritorious service. (See page 5)



▼Howard Zahniser (left), Executive Director of the Wilderness Society, and Thomas L. Kimball, Executive Director of the National Wildlife Federation.



▲Reading left to right, Alexander M. White, President, Board of Trustees, American Museum of Natural History; James Fisher, British ornithologist and a principal speaker at the annual dinner; Mrs. Roger B. Hull, President, City Gardens Club.



▲Robert J. Hamerslag (left), Chairman, Board of Directors, National Audubon Society; Fairfield Osborn, President, The Conservation Foundation; Mrs. Charles D. Webster, President, The Garden Club of America.

▼Frederick G. Vosburgh (left), Vice President, National Geographic Society; Mrs. Jamie L. Johnson, President, National Council of Garden Clubs, Inc.; Dr. Ira N. Gabrielson, President, Wildlife Management Institute.



Wren Forever

The story of a six-year-old Bewick's wren and the accident that came in his last year of life.

By Ruth Thomas*

EARLY on the morning of June 3, a Bewick's wren was squatting flat on its belly to eat peanut butter on the porch table. The "squat," with the long tail straight out and motionless, was so unnatural for one of the twitchiest little birds on earth that I continued to watch from the living room window.

After a moment or two, the wren stood up unsteadily. I saw then that the left leg dangled, broken at what we think of as a bird's knee though actually it corresponds to a human's ankle. On the good right leg were two bands, the government metal band and a green celluloid band, identifying him as my treasured oldtimer, known simply as "Wren," who for more than four years had been the year around "owner" of our Arkansas hilltop.

I watched with dismay as Wren took one hop and fell to his breast. He wobbled up, tried again, and fell. On the third struggle up, he flew to the yard and turned west toward the barn. *Poor Wren!* Tott'ery as he was, would he be able to find food enough? He could, of course, return to the table, but I doubted that peanut butter was by itself an adequate diet. How had he suffered such a hurt? There was no shooting on our hill, and predators do not commonly seize a bird by the leg.

Then I remembered Wren's family—seven fledglings, the second

brood of the season, that just four days before had left a nest-box at the barn. Surely it would be impossible for him to go on feeding them.

For the rest of that day, and all of the next, I did not see Wren and I thought he had died. Meanwhile, the little bird so gentle that I called her "Sweetie"—Wren's mate for two years, winter as well as summer, with a yellow band for sight recognition—looked after the fledglings. She not only hustled to find insects and insect larvae, she stuffed those youngsters with peanut butter. In she would fly to the porch table, then off with a brown dab in her beak.

On the third morning, on my way to the barn, I found Wren sprawled beside the path. Pitiful Wren, drinking dew from the grass! Thirsty, perhaps feverish, unable to stand on the rim of bowl or pool, he might not have tasted water since the dew of the morning before.

But Wren had recovered from the shock of injury, and on that day started flying about with his family. While Sweetie foraged and the wrenlets talked the baby notes, "*Eek, eek,*" he rested, breast down, on a fence post or a low branch, often on the ground. He was finding it extremely difficult to hop on one leg. Again and again I saw him fall and put out his wings as crutches.

Yet the next day, the fourth since the hurt, Wren flew to the doorway of a wren house on the trellis at one end of our porch, and keeping a shaky balance, sang the full song of running notes and trills. He would yet have a third family! It seemed to me a pity that instinct bound even a little crippled bird to the treadmill of nest, nest, nest.

Again the next day, Wren sang at the trellis house. Then he coaxed, as in courtship and at the start of a

nesting cycle, with the baby notes, "*Eek, eek, eek, eek, eek.*" Sweetie, at the table, kept on eating peanut butter. With seven children going "*Eek,*" she was in no mood to listen to Wren's eeks for another family. But later she offered to feed him as he rested, breast down, on the porch banister. I think she mistook the crouch for a baby's begging posture. Wren threatened to peck her for the "insult!"

By then he could stand fairly well, even manage a tail twitch, and he resumed feeding the fledglings. They flew after him, clamoring for every insect that he found. Two or three followed him to the table and begged, mouths open and wings aflutter. Again I said, "*Poor Wren!*"—for as he leaned forward to poke a dab of peanut butter down a wrenlet's throat, he toppled over. Getting up, he made a quick motion of the upper left leg to flip the shriveled lower part so that it turned backward. With the next feeding, he again fell and the loose leg slid forward or to one side. Again he flipped it out of the way. Sometimes he pecked at it, as if irked by the nuisance.

Sweetie disappeared when the fledglings had been out of the nest 16 days. I did not believe that a predator had captured her; it was the rule for a female Bewick's wren to wander off at the close of the nesting season. And she deserved a rest.

For another week, Wren alone fed the youngsters. Thereafter, they could find their own food and help themselves to the peanut butter, yet for several days more a young wren begged in the babyish way when it chanced to meet its father at the table. And Wren, falling, flipping the left leg, placed a lump of peanut butter in the young one's throat. Then he rested on breast and belly, not a twitch in the long tail.

On July 1, Wren went into a trap which I had set in order to band young mockingbirds, and by so doing gave me a chance to examine him. Just above the broken joint was a pus-filled swelling. The lower part of the leg hung by a tendon that had been twisted around and around, no doubt by the constant flipping. Amputation was necessary, but I lacked the nerve for the job. I did, however, soak the swollen area

* Ruth Thomas, in our opinion, is at her best when writing about individual birds. As a bird-bander, she has known certain birds well, and has catalogued their lives in wonderful detail. Readers may remember her first delightful tale, "*Crip, Come Home!*" the story of a brown thrasher, published in the May-June 1950 issue of *Audubon Magazine*. "*Crip, Come Home!*" became a book, and this was followed by another tender and accurate portrayal of the lives of a pair of Carolina wrens, "*The Constant Carolinas,*" (*Audubon Magazine*, January-February 1953 issue). We believe our readers will find equal charm in "*Wren Forever.*"—The Editor

in Epsom salts solution, then painted it with an antiseptic.

Early in August, the useless leg fell off. Wren seemed to stand and hop the better for its riddance, yet he still rested a great deal. Often I saw him spread flat on the banister. It was the dull time of molting, and Wren neither sang nor *eeeked*.

September was the time for autumn courtship and betrothal, the time for a resident Bewick's wren either to court his former mate or take a new winter companion. And Sweetie had not reappeared.

The Bewick's wrens from farther north were going south for the win-

ter. Wren hurried every male traveler across the hill with fussy scolds, "*Neh-neh-neh-neh-neh*." ("Move on, Stranger!") The stranger moved on, with many a twitch to show that he wasn't afraid of a resident owner.

But a lady wren, a potential sweetheart—ah, that was a different matter! In late September, a maiden stayed for three days while Wren sang the fast silvery songs and led her to one nest box and then another. Patiently he wheedled, even as he rested on the banister, "*Eek, eek, eek, eek, eek*."

That young wren was a flibbertigibbet! I had not realized the

change in Wren's actions because of the loss of his leg, until I watched her, forever hopping, forever twitching the long tail. Wren had to take care, twitching, that he did not topple over. And the maiden was prettier, slim, and satiny smooth. Wren so often fell, putting out his wings as props, that already his new feathers looked a little worn.

October came, with the oak leaves gold in the sunshine, and Wren was still alone. Then on the morning of October 10, he stood on a bean pole in the garden and sang his fast songs, over and over; they streamed out like welcome banners. Sweetie had returned for her third autumn betrothal to the old wren. Gaily, she was bouncing from one tomato stake to the next, down one long row and up the other.

Together, Wren and Sweetie roamed over the hill. They visited their houses, and for several days carried tufts of hair, gleaned from the fences where my goats had rubbed, to the nest in which the last brood had been raised. It was the first time I had known Bewick's wrens to do any work on a nest in the autumn. Of course, the work was play and courtship; no baby wrens would snuggle in that nest in winter, but it was so cozy that I hoped Wren would choose it for his winter sleeping place.

For about six weeks, while the old leaves rustled gently to earth, our wrens stayed together. Nearly always it was Sweetie that I saw first, hopping in my garden or on a stone wall. Wren could not hop for long at a time and was often resting, breast down. Then a song or the softly rattled notes of contentment, "*Plit, plit*," told me where to find him.

With the first hard freeze in late November, they began to go separate ways and Wren forgot his songs. Year after year I had seen our Bewick's wrens break up for the coldest part of the winter yet retain the bond of mates. They met often, in garden or fencerow, and many winter afternoons I had watched a pair come up the hill together to roost inside the barn, each in its own cranny or wren house.

Wren and Sweetie met most often at the porch table because Wren stayed there much of the time and Sweetie would stop by for a snack.

Continued on page 54

Photograph of Bewick's wren and young by Thase Daniel.





THE PRESIDENT REPORTS TO YOU

By Carl W. Buchheister, *President of the National Audubon Society*

Continental Bald Eagle Project

A study of the literature reveals that the bald eagle may have been declining in numbers a long time, perhaps for most of a century. Forbush speaks of it in his "Birds of Massachusetts and Other New England States," published 33 years ago. Many kinds of wildlife suffered drastic reductions from about 1890 to 1920, the period that prompted the birth of the Audubon movement and the growth to national prominence of the National Audubon Society. The passenger pigeon, we recall, disappeared as a wild bird between 1900 and 1907 and the last remaining representative of the species expired in the Cincinnati Zoo in 1914. The last wild heath hen disappeared in 1932.

Many species, both mammals and birds, skidded from abundance to scarcity as drainage blotted out great areas of now forgotten marshes in the East, Midwest, South, and as power machinery revolutionized agriculture while conservation lagged from 1920 through World War II.

There are alarming signs that the bald eagle, symbol of our nation's majesty and might since it was so dedicated by act of the Second Continental Congress in 1782, may be following the passenger pigeon and the heath hen toward the point of no return. It would be unthinkable, of course, to permit the bald eagle to become extinct. It would be unthinkable even to let it reach the state of crisis from which we are now trying to rescue the whooping crane.

Experience and common sense dictate that the first task must be a thorough, scientific study of the bald eagle: to inventory its numbers throughout its North American range—this species does not occur elsewhere in the world except as accidentals—and, concurrently, to investigate its feeding, nesting, and migratory habits, its reproductive success, and other factors affecting its survival.

One cannot prescribe for a sick species until a careful diagnosis has been made of the malady. The general factor depressing the bald eagle is known: declining habitat due to changes wrought by man in the landscape. But while the general cause is known, the specific ways in which the eagle is affected by a changing ecology are not known. Once the biological and ecological facts are at hand, we are confident that methods will be devised to save the eagle, just as the wild turkey, the pronghorn antelope, the trumpeter swan, and other species thought doomed a few decades ago, have been brought back to comparative security. It was National Audubon Society research that laid the groundwork for a program that has arrested, at least, the decline of the whooping crane.

For these reasons the National Audubon Society has begun the Continental Bald Eagle Project, a five-year cooperative research program. A continent-wide survey of the population and distribution of the species is now being organized under the direction of our Research Director, Alexander ("Sandy") Sprunt, IV, and we have solicited the cooperation of federal, state, and provincial wildlife agencies, and local Audubon groups and ornithological societies, throughout the United States and Canada. We have no illusions about it. Without their assistance we cannot get the job done.

We estimate the five-year project is going to cost in the neighborhood of \$50,000 over and above our regular research budget. To raise the money we are going to need broad public understanding and support. This is where you, as a member of the society, can help.

Photograph of bald eagle by Carl W. Kenyon.



Explain the Continental Bald Eagle Project to your neighbors. Help publicize it. Offer your friends proudly the privilege of becoming a member of the society and a contributor to its conservation goals.

A Good Year for the Whoopers

A few years ago the whooping crane was commonly referred to as "the symbol of vanishing wildlife." But the meaning of this great bird has broadened and brightened as the prognosis improved. It now represents endangered wildlife that need not perish from the earth. It also symbolizes the effectiveness of cooperation in conservation, the fruitful teamwork between government agencies in Canada and the United States, between government and non-government organizations, and between the individual citizen and the government agencies to which he entrusts the care and protection of his natural resources.

Not the least of its meanings is that here is an example of modern science applied not for material gain or leading potentially to destructive ends, but bent toward saving something that is valued by man only because it is beautiful.

The good news from Aransas is that 1960 was another good year on the nesting grounds in Canada. Six young of the year came to the wintering grounds with 28 returning adults. Counting the two cranes that elected to stay in Texas last summer instead of migrating, the wild flock now numbers 36. This is the most since the plight of the whooping crane became a conservation *cause celebre* two decades ago. The halting climb back from near extinction, not yet assured of success by any means, started in 1938 when only 14 whoopers were known to exist except for a small, non-migratory band in Louisiana that eventually disappeared. As late as 1955 only 21 birds could be counted in the wild flock.

There was still hope, as this was written, that three adults missing from the 31 that went north last spring, might still show up at Aransas.

Our Thanks to the Speakers

I want to say thanks for the Society to the following conservation leaders and scientists who presented papers, shared their photography, or took part in panel discussions during our recent convention (including NAS staff members who performed on the rostrum):

Dr. John J. Craighead, Alexander Sprunt, IV, Frederick Kent Truslow, Mrs. Laurel Reynolds, Chandler S. Robbins, Dr. C. M. Tarzwell, Walter E. Crissey, James T. McBroom, Robert C. Hermes, James Callaghan, Herbert H. Mills, Dr. William H. Drury, Jr., Dr. Carleton Ray, and Mrs. Paul L. Grambs.

We are especially grateful to James Fisher who came from London to present "*Seabird Summer*" to the banquet audience of more than 600 persons, and to the Royal Society for the Protection of Birds for making the film available for Fisher's discerning and entertaining lecture. This constituted an important contribution by Fisher and the Royal Society, further cementing the growing friendship between NAS and the RSPB.

We are indebted to two dedicated young conservationists from the political arena for another successful innovation. Congressman John D. Dingell of Michigan, representing the Democratic Party, and Under Secretary

of the Interior Elmer Bennett, speaking for the Republicans, engaged in a spirited but good-humored debate on the conservation records and platforms of their respective parties.

Our congratulations go to Mr. Dingell upon his reelection to Congress. We are glad he is in position to continue his legislative leadership for needed conservation laws.

Although the victory of Mr. Dingell's party in the national election means Mr. Bennett will soon be leaving his present position, we wish to congratulate him also upon his distinguished service in the Department of the Interior. We predict the outcome of the recent election will mean only a temporary setback at worst, and maybe only a shift, in the public service career of this able administrator.

To Atlantic City in 1961

The good attendance and enthusiasm evident at our 1960 convention indicates, we think, the internal health of the National Audubon Society and the importance of the work it does. As President, I wish to thank all the members and delegates who participated in the meetings and express my pleasure at having this opportunity to greet you in person. Our next convention should be even "bigger and better." Certainly attendance should increase with the opportunity for field trips to the Brigantine National Wildlife Refuge, one of the largest and most important federal sanctuaries on the Atlantic coast, and to other coastal, marsh, and pine-barren habitats in New Jersey. Seldom seen shore and marsh birds and great flocks of waterfowl will be observed.

For the first time in many years all our convention sessions will take place under one roof. Mark the dates now on your calendar and make your reservations early: October 28 to November 1, 1961, at the Chalfonte-Haddon Hall Hotel, Atlantic City, New Jersey.

The plans are only preliminary now, but there will be a banquet as part of the Atlantic City convention. Then later, in keeping with a tradition of long standing, a National Audubon Society dinner will be held at the Roosevelt Hotel in New York City. This event has been set for November 29, 1961.

Hats Off to the Campfire Girls

Do you have Campfire Girls in your community? Then you must have noticed the new trees and flowers springing up, new trails of bluebird houses, less litter in your public parks, and groups of young girls studying soil erosion and other natural resource problems. They were busy learning about conservation and doing something about it. It was the Campfire Girls' Golden Jubilee Project, a well-conceived, well-coordinated national program of conservation activities extending over two years.

While many improvements in the landscape were turned by the eager young hands, the important, long-range gain for America will come in a new generation of citizen conservation leaders, as these girls grow into womanhood.

Now that they have caught the torch and held it high, they must not let it fall. Their Golden Jubilee celebration has passed, but we hope the Campfire Girls will keep conservation as a major activity in their program.

—THE END

**JAY N. DARLING RECEIVES
AUDUBON MEDAL**—Continued from page 7

we might have been today but for the untiring efforts of the Audubon Society and such heroic collaborators as Roger Tory Peterson, the late and much beloved T. Gilbert Pearson, John Baker, Guy Emerson, and the many unsung contributors who by their gifts have made possible your widespread activities.

Among these activities your pioneering educational programs have been too important to omit mentioning. I refer to Audubon Camps

where you are still setting the pace in using nature's own laboratory to train teachers and other adult conservation leaders; your educational centers for children; your lecture program and wildlife tours; and, first in history and by no means last today, the Audubon Junior Clubs.

I hope the day may come when we can see candidates for public office in attendance at conservation meetings, and that they may find time to learn the difference between exploitation and conservation.

One word of caution. You have

won magnificent battles, but the war is not yet won and will not be until the 31,000 other segregated groups, associations, leagues, chapters, and clubs in the U.S.A., each in its separate way committed to its own specialized interest, join hands and pull together to combat the malefactors who continue to make deserts of our uplands, misappropriate and pollute our streams and lakes, drain our sloughs, and with ignorant application of insecticides destroy the rich environment necessary to existence and joy of living.

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★ ★ ★ NATURE IN THE NEWS ★ ★ ★

Reprinted from The New York Times December 8, 1960

Hungry Owls Perform Nightly for Backyard Bunch in Jersey

By Robert H. Phelps

Special to The New York Times.

ALLENDALE, N. J., Dec. 7—Every night when the weather is right a group of people gather quietly here for an owl show.

The stars and only members of the cast are two long-eared owls, commonly known as hoot owls. The audience is composed of fifteen to twenty members of the Fyke Nature Association who meet at twilight in the yard of Stiles Thomas, a local insurance broker.

MEETING AT TWILIGHT: Members of the Fyke Nature Association watch hoot owl as it flies close to their position in yard of Stiles Thomas, New Jersey insurance broker.

The New York Times



The show, which has been running three weeks, begins when Mr. Thomas squeaks like a mouse. To the assembled bird watchers this is a signal to bring flashlights and binoculars to the ready. To the owls, roosting in a near-by hemlock grove, it is a call to dinner.

The owls, as big as crows, sweep silently, like giant, shadowy moths, out of the woods and perch on one of the apple trees in the yard. Then Mr. Thomas brings into play his only "prop"—a dead mouse on the end of a twenty-five-foot fishing line.

As the bird watchers hold their breath, he pulls the bait slowly along the ground through the leaves. One of the owls pounces on what looks like easy prey. At the last moment, however, Mr. Thomas yanks the bait out from under the owl's talons.

The owls do not give up, however. First one, then the other, swoops down to grasp the bait. Each time the bait is jerked away. And each jerk brings the bait and the owls closer to the entranced bird watchers, until they are only a few feet apart.

Mr. Thomas gives the bird watchers a chance to study at close hand the brown birds with long, close-set ear tufts and red faces. Then he closes the show by throwing a meal to the owls.

The owls, however, like many actors, are unpredictable. Sometimes they refuse to leave after the show is over; they perch in the trees, undismayed by the lights sprayed on them. Sometimes one or both refuse to appear, despite repeated squeaking by the bird watchers and a choice offering of mice.

Mr. Thomas believes the show serves two purposes. In addition to the opportunity for study by bird watchers, it provides proof, he says, that owls are valuable because they kill animals, such as mice, that are harmful to man.

Two Albino Bluebirds

Two albino western bluebirds were first observed here on July 26, 1960, by several employees of the Los Alamos (New Mexico) Scientific Laboratory, in a small patch of pine woods adjoining the parking lot of the main administration building.

A laboratory photographer, W. H. Regan, managed to get several telephoto pictures of the birds individually but could not catch them together. The birds were observed for about an hour by several people, including an amateur ornithologist, W. Burton Lewis, who is a member of the National Audubon Society.

All agreed that from the configuration and actions of the birds they were undoubtedly young bluebirds. They were in the company of a small flock of other normally-colored young bluebirds accompanied by a pair of adults, which are quite common at this altitude (7,300 feet).

The photograph was made with a 300 mm. lens on a 35 mm. camera, shortly after noon in deep second-growth ponderosa pine woods. The exposures were at f. 8 and f. 11 at 1/500th second, on Plus X film, at a distance of 25 feet, the minimum possible with this lens.

On August 17, the young albino bluebirds were still around and seen every day in the neighborhood of the laboratory, and even on the front lawn. Then there were three of them, the two albinos and one larger, normally-colored and apparently mature. Nobody wants to conjecture that the adult is the parent of the other two, but they *do* travel together! They created quite a stir here, as they were not very wild and were seen frequently.

JOHN V. YOUNG
Public Relations Officer

Los Alamos Scientific Laboratory
Los Alamos, New Mexico

Albino bluebird, photographed by W. H. Regan at Los Alamos, New Mexico.



BIRD BEHAVIOR— Ethology

By Arthur A. Allen*

THERE is a flock of grackles at the feeding station below my window as I start this chapter. They are mostly birds hatched this spring and are now molting into their first winter plumage with spots of fresh iridescent feathers here and there. They travel together as a flock but they do not seem very friendly toward one another and are frequently bickering and fighting—each one trying to claim ownership of the whole feeding log. Sometimes they clinch bills and strike each other with their wings or rise into the air and scratch each other with their feet or even roll off the log together, striking and scratching.

Some of the younger grackles open their mouths at the approach of another bird as though they were still begging food from their parents but the incoming bird's chest goes up and it knocks the begging bird over the head with its bill. Then the beggar's bill goes up and they face one another with a glassy stare as though trying to intimidate one another. Altogether they waste a good deal of time and neither one gets anything to eat.

What they are really doing is building up a "peck-order" in the flock so that when it is recognized there will be no more fighting and each bird will recognize its superior at a glance and make way for it. When their parents came to the feeder this spring, fights seldom occurred—their behavior was all ritualized so that when a second bird approached the first, each would throw up its chest, point its bill toward the sky, and glare at the other bird. Usually this was sufficient and one would back off. If not, one of the birds would puff out all its



Action of young grackle opening its mouth is a releaser to the parent bird's instinct to feed it. Photograph of grackles by Hal H. Harrison.

feathers, spread its wings, and give its vocal challenge as well as its visual and this was usually sufficient so that the "childish" fighting that goes on with the immature birds seldom occurred.

The flock of grackles that frequented the feeding station was a smoothly running organization where each bird recognized where it belonged in the "peck-order," which of its neighbors it had to respect, and which ones it could dominate, so that little time or effort was wasted on actual fighting. The birds were free to feed as soon as their superior left, and they could have more time for the more immediate business of finding a mate. This, too, had become a stereotyped procedure calling for a very definite song and display of plumage, etc. Indeed a bird's whole life seems to be governed by one series of rituals following another in a definite se-

quence over which the bird exercises relatively little conscious control. Some of the patterns improve with practice or by learning from others, but most of them seem more or less innate for each species—connected with the genes—so that they are inherited from one generation to the next.

Closely related birds usually have similar patterns of behavior but each species has certain characteristics within the pattern, both visual and acoustical, which tend to prevent hybridization as surely as the color of the plumage itself. When hybrids do occur, inherited behavioral patterns are often antagonistic to one another so that frustrations occur in the hybrid generation. The individuals are less well adapted to life and either do not survive or are unable to find mates.

On the pond here at the Sapsucker Woods Laboratory at Ithaca,

* This is a part of a chapter on bird behavior from the revised edition of "The Book of Bird Life," by Dr. Arthur A. Allen, to be published in the spring of 1961, copyright by D. Van Nostrand Company, Inc., Princeton, New Jersey. Permission for advance publication of this material has been granted by the publishers.—The Editor

New York where I am writing we have a hybrid (redhead crossed with a shoveller) that is very confusing to all the other ducks as well as to himself and most of the observers watching him. At times he dives with the redheads, at others he guzzles with the shovellers, and most of the time he swims around with a jerky motion that is characteristic of neither diver nor dabbler. This spring he felt the urge to do a little courting when all the other drakes were hard at it. In general male ducks have a ritualized procedure the most striking incident of which is what Lorenz calls the "grunt-whistle" for the mallard and which is very similar in all the dabbling ducks. At this time the male stands up vertically in the water and throws his head down onto his breast at the same time giving a little whistle and a grunt. The similar ritual in the diving ducks calls for throwing the head back towards the tail so that the back of the head strikes the back. As the head comes forward again the drake utters his characteristic sound which in the redhead is "carr-r," in the canvasback "cuckoo," and in the golden-eye "beard." Our hybrid tried to combine the salient features of each pattern, if that is possible, rising in the water like a shoveller and then throwing his head back on his shoulders like a redhead, a mixed pattern not recognized by any species—so that no duck paid him the slightest attention.

I once had the opportunity of watching a hybrid (prairie chicken crossed with a sharp-tailed grouse) that frequented a booming ground of the prairie chicken in Wisconsin. Apparently his booming was good enough to be recognized by his neighbors for what it was intended though his air sacs were lavender like a sharp-tail's instead of orange-yellow. When he boomed, his nearest rival would come running over and challenge him to a fight in characteristic prairie chicken poses. He answered, however, by spreading his wings and raising his tail in sharp-tail fashion and then started to dance. His rival would immediately lose interest, turn around and go back to his own little territory, thus showing the importance of the complete ritual in courtship behavior. No female came to the booming

ground while I was watching but I am sure she would have responded as did the male with a complete lack of interest.

Dr. William C. Dilger, my colleague at the Laboratory of Ornithology, has been studying for several years the behavior of a group of African parakeets belonging to the genus *Agapornis*. He has eight species of the genus in the aviary, each one of which meets the exigencies of life with a pattern of behavior characteristic of that species. Dr. Dilger has worked out these patterns very carefully. In the wild state, these birds occupy different parts of Africa so they do not come in contact with one another and have no occasion to hybridize. In captivity, however, when they are given no choice, certain of them, in spite of the fact that their plumages are quite different, hybridize freely and produce vigorous offspring that nest freely.

It is interesting to observe, however, how the parental behavior patterns, as inherited by the young, conflict to produce frustrations. For example, it is customary for all of them to cut narrow strips of bark (or paper in captivity) about 1/4" wide and 6" long as material for nest building. The females of certain species, *Agapornis fischeri*, for instance, carry this paper to the nesting box in the bill like most ordinary birds. Others, however, like *Agapornis roseicollis*, tuck one end of the strips under the feathers of the lower back. These feathers are different in some way from those of most birds and normally will hold from five to ten of the streamers before the female flies to the box. The hybrid young apparently inherit the "tucking" instinct but not the ability to hold the nesting material successfully. So the hybrid female spends a great deal of time cutting and tucking—only to have the paper promptly fall out whenever she moves. Finally she grabs one strip in her bill and flies to the nest box. When she returns for more material, she continues the "tucking" pattern, not learning very much from the experience.

There is a group of New World flycatchers belonging to the genus *Empidonax* which, to our eyes, look very much alike (the least, Acadian, Traill's, western, etc.). Indeed, two of the species look so much alike

that taxonomists lump them together and the ones from Alaska to Maryland are even placed in the same subspecies, *E. traillii traillii*. It is common knowledge, however, that the southern birds have a distinct "song" and easily distinguishable nests. The northern birds call "PHE-BE-O" and make bulky nests of grasses; the southern birds call "FITZ-BEU" and make compact nests of cottony materials. In certain overlapping range areas of New England, New York, Michigan, and farther west the two types occur side by side with no apparent intermediates or hybrids. Experiments by Dr. Robert Stein in playing the songs of one group back to the other indicate that there is no recognition between them and that they behave as two different species as they may well be.

Thus we begin to see the importance of the study of bird behavior and the many surprises that are in store for the keen observer. The study of ethology is so comparatively recent, however, that, as might be expected, a new vocabulary is arising and various interpretations are given to the same facts of observed behavior. When such divergent fields as psychology, physiology, ecology, taxonomy, and good old-fashioned natural history are all involved, it is little wonder that conclusions are somewhat confusing. The interested student will read some of the illuminating papers of Konrad Lorenz, Armstrong, David Lack, Niko Tinbergen, H. E. Howard, and Poulsen in Europe and those of Emlen, Dilger, Kendeigh, Lehrman, Nice, Rand, Whitman, Wolfson, and others in this country, before he feels qualified to interpret all the varied aspects of bird behavior that come under his observation.

Even then he will be at a loss to explain some of the things birds do, like "anting," for example, when birds rub ants and sometimes other materials on their feathers like cosmetics.* A good beginning will be made by reading Chapter 5 of "Recent Studies in Avian Biology," "The Study of Behavior in Birds," by John T. Emlen, Jr., published by the University of Illinois Press under the sponsorship of the American Ornithologists' Union.

We are doubtless safe in assuming

* See page 41 of this issue for the concluding part of "Story of Bird Anting," by David Gunston.—The Editor

that it is essential to the bird's way of life that it be endowed with an innate pattern of behavior that may be perfected through use but which covers all its natural activities. The general pattern is transmitted from parents to offspring as surely as the color of the feathers or the length of the bill. Like such physical characteristics, the pattern is not complete at the time of hatching but is given expression as the bird matures and gains the use of its eyes, ears, and physical means of reacting. The various behavioral aspects of this pattern are released by certain elements of the environment ordinarily to the distinct advantage of the bird. For example, young robins in the nest, before their eyes are open, respond to any jarring of the nest such as might be caused by the returning parent, by stretching up their necks and opening their mouths. The orange mouths serve as releasers to the parents to feed and to place the food where it belongs. A week later, after the young have gained the power of sight, a similar jar to the nest causes the same birds to crouch and hide in the nest (as though in the presence of an enemy) until they actually see the parents or hear them call. Then they open their mouths and give a call that is now necessary as a releaser for the feeding reaction of the parents. After they have left the nest and the parents have to find them, in the trees, this "hunger call" is much more important in helping the parents to find them, but the gaping orange mouth is still necessary to release the feeding reaction.

The innateness of the stimuli and the releasers was nicely shown by Tinbergen in his work with herring gulls, when the small young gaped for a red spot on a cardboard bill and the parents tried to feed pink paper mouths set up alongside the young. Of course, these "blind instincts" are soon affected by the learning process and some young recognize, as their parents, the first larger creature that takes care of them. Lorenz's incubator-hatched goslings quickly attached the parent relationship to him and followed him about as though he had laid the eggs and sat upon them for a month. He calls this "imprinting" and it can produce strange bed-fellows.

Some of these innate propensities are cyclical and are apparently gov-

erned by the activities of certain of the ductless glands like the pituitary or the thyroids or the adrenals or the gonads, they themselves being governed by releasers from the sun or other unknown factors of the environment or by internal metabolism. The various activities of the mating season, for example, such as song, courtship, display of plumage, mating, nest building, incubation, etc., varied as they are in the different species, are released at only a certain season of the year and in a definite sequence.

In a few species like the cowbirds, the honey-guides and certain cuckoos, and weaver finches, the sequence is interrupted at the nest-building stage and the birds have become social parasites, laying their eggs in other birds' nests. Some birds accept the cowbirds' eggs, some throw them out, and some bury them in the bottom of the nest by building a second story over the offending egg. Those species which refuse to accept the cowbird's egg, however, will usually accept a young cowbird if it is placed in the nest, responding to its food call as if it were identical with its own nestlings. . . .

In some birds, especially evident in those in which the males are brilliantly colored, the acquisition of bright colors by the females is merely inhibited by the hormone estrogen secreted by the ovary, and when the ovary is removed the female acquires male feathers and male behavior at the next molt.

The song of a bird, in addition to attracting females, is a challenge to any other male bird of its species to keep out of his territory and birds with near neighbors sing more than those that do not hear others of their kind singing. In our project of recording the songs of our native birds, we sometimes take advantage of this behavior pattern by playing the bird's own song back to him which usually results in bringing the bird right down to the loudspeaker where his song can be recorded much more satisfactorily, especially in noisy environments. If a mirror is added to the speaker, the challenging bird will often fight the mirror as well as do his best singing. When we hung the loudspeaker on the fence post where a bluebird was building a nest and played his song back to

him, it produced an unexpected reaction in that when the bluebird could not find his rival, he attacked his own nest, in what might be called a redirected aggression, and started throwing out all the grasses his mate had so laboriously gathered.

Another unexpected reaction occurred when we tried to stimulate a group of three whooping cranes to call. They are usually very quiet during the winter and so unapproachable that the only record of their voice we had secured was by sneaking up on a pair in a fog. Since the recording was not very satisfactory we planned to play it back to the group of cranes that occasionally came to a fresh-water pond on the Aransas Refuge. We, therefore, concealed ourselves in a blind with a parabola and its microphone aimed at the far side of the pond where the cranes occasionally came to drink. We concealed the speaker on the near side of the pond and waited two days for the cranes to come. They finally came in silently and remained silent during their drinking and feeding. Then we turned on the tape we had previously recorded in the hope it might stimulate them to utter some kind of an answering call which we could record. The effect of the recorded sound was instantaneous. It was obviously an alarm note and it released no answering call but the birds jumped into the air and headed for distant parts without uttering a sound.

There is no end to the experiences which one could recount in studying the behavior of birds but just what the explanation should be, in each case, is not always clear. As Emlen states, "Stimulus and response are the basic attributes of environment and organism respectively in this relationship," and "Because of the stereotyped and relatively inflexible nature of many of their responses, birds have proven to be excellent subjects for analyzing the inherited and acquired components of behavior." The student of bird behavior will therefore have many rewarding experiences and can expect a good measure of surprise and entertainment in his studies, but one should become thoroughly familiar with the basic principles of ethology and with the bird being studied before intelligent interpretation can be made.

—THE END

EMERALD KINGDOM

The beauty, mystery, and natural history of the Society's famous Corkscrew Swamp Sanctuary are portrayed here in a memorable article and photographs.

All photographs by Donna N. Sprunt unless otherwise noted.

Moss-draped cypresses that were old in Columbus' day rim Corkscrew's Lettuce Lake.

By Alexander Sprunt, Jr.*

WE WERE sitting, my companion and I, in a place of silence. It was late afternoon, there was no wind, and the sun had disappeared behind the magnificent back-drop of moss-bannered cypresses. The scene before us was one of tranquil beauty, an open lagoon, carpeted with water-lettuce and rimmed about with towering trees, some of which were a century old when Columbus made his landfall in the West Indies.

The sense of antiquity, plus the primeval loveliness of what lay before us had cast a spell upon us which precluded words. We simply sat there on a bench built into the

* Mr. Sprunt, author of "Florida Bird Life" and former Director of Southern Sanctuaries for the National Audubon Society, has been conducting Audubon Wildlife Tours in Florida for 20 years. His knowledge of Corkscrew Swamp is equaled only by his ability to write vividly about it.

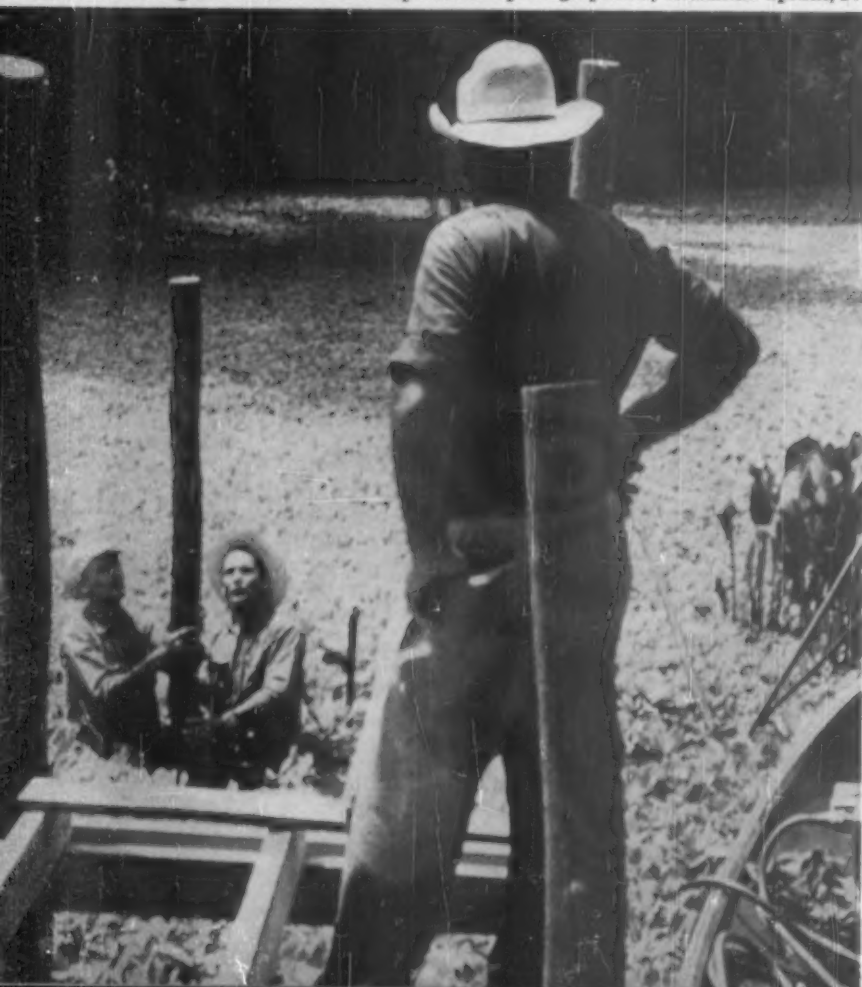
—The Editor





Wood stork photographed by Allan D. Cruickshank.

Task of building the boardwalk in swamp waters as photographed by Alexander Sprunt, IV.



sanctuary boardwalk, and lost ourselves in the almost photographic rigidity of what lay before us. Moments and minutes passed, then suddenly, but still silently, sweeping in across the tops of the cypresses into the blue cloudless dome above us, came an aerial creature of infinite grace and beauty. Shining white it was, with long, pointed wings, the ends and trailing edges of which were black, as was the wonderfully forked tail. It swung in a wide spiral with such effortless and exquisite mastery of the air that the whole effect was breath-taking. Then, in a steep glide, it pitched downward, barely skimmed the top of a nearby tree and after a lightning-like movement of one foot, soared upward with a brilliant green lizard squirming in its talons.

High above us now, in easy grace, the swallow-tailed kite enjoyed its meal—an incredibly lovely bird in an equally lovely setting. Such is the Corkscrew Swamp. If one were asked to compare this place of natural beauty to a precious stone, the gem would have to be and emerald!

Geographically, Corkscrew Swamp lies in the northern part of Collier County, southwestern Florida, in that area known as the "Big Cypress." The Everglades lie miles to the eastward, the Gulf of Mexico some 12 miles to the west. Corkscrew is equidistant from both Miami and Palm Beach—128 miles away. It is 70 miles southwest of Lake Okeechobee; 16 miles northeast of Naples, and 25 miles east of Fort Myers. The name derives from a very crooked creek feeding a marsh at the northern end of the swamp, and an adjacent village which bears the name, Corkscrew.

In local terminology, Corkscrew is a "cypress strand," a phrase to denote a finger-like band of cypress growth of varying length and breadth. These strands are bordered by stretches of "wet prairie" (where nothing but grasses grow, with attendant flowers) and pine "flatwoods." Many of the strands bear names and most of them have been denuded of marketable timber. Actually, the Corkscrew Strand, or what remains of it (the sanctuary), has the country's largest remaining stand of virgin bald cypress, and some of the oldest trees in eastern North America. In the mid-part of



700-year-old cypress encircled by boardwalk.



Fox squirrel photographed by John H. Gerard.

Pond cypress.



1954 the Corkscrew Swamp was next on the list to be cut by its owners, the Lee Tidewater Cypress Company. It was the last remnant of the original Corkscrew Strand, once more than 20 miles long, but which had been reduced by lumbering. It is now a tract about three miles wide and rather more than that long. Before this last stand was cut, the National Audubon Society and its many cooperators got the Lee Tidewater Cypress Company to give the Society an option on $3\frac{1}{2}$ key sections of the tract.

An intensive campaign was begun and the need broadcast. Many rallied to it, particularly foundations, garden clubs, nature organizations, and individuals, and the result was that \$170,000 was raised for acquisition and \$30,000 for such necessary costs as constructing the boardwalk for visitors, fencing, and initial housing.

Of this amount, \$170,000 was paid for 2,240 acres of the primeval tract and, as a Christmas present, the Lee Tidewater Cypress Company gave the National Audubon Society an additional section (640 acres) which has been designated the "J. Arthur Currey Forest," named for the president of the company. This section includes the present headquarters area and the part of the swamp penetrated by the boardwalk.

The Collier Company was a generous cooperator in that it leased 3,200 acres to the Society at \$1 a year, with provision for payment by the Society of \$25,000 at later date of title delivery. Thus the entire area now under control by the National Audubon Society is 6,080 acres.

Having secured this invaluable wilderness, the Society now faced the problem of making it available to people who would be interested in visiting the sanctuary, yet keeping it undisturbed. How to do it? Even if it were desirable, few would care to investigate the fantastic beauty of the swamp by "bogging it out," or wading hip-deep through sawgrass, arrowhead, and water-lettuce as did a party of distinguished guests in 1955. The obvious answer was—a boardwalk which would take the visitor to the heart of the area, dryshod. In late 1955, one was started and about a thousand feet were completed into what is known as First

Lettuce Lake, in December of that year. Later, it was continued into the heart of the big tree section by December of 1956 and at this writing, there are 3,555 feet of this walk through a botanical fairyland.

It was a monumental undertaking, necessitating working in water at times chest high. Every cypress post was set by hand by a local crew who knew their job and the local country, and it took four-and-one-half months to build it. The boardwalk made it possible for the Audubon Wildlife Tours to bring guests there. In 1957 these were started, basing at Clewiston on Lake Okechobee, 70 miles away. Clewiston remained the base for three seasons then, in 1959-60, the tours were based at Naples which is much closer by reason of a new highway. The trips from Naples are run from January through April each year. During the summer, the tours are also conducted, but are based at Miami.

In the winter of 1959-1960 the headquarters for maintenance and protective personnel at Corkscrew were enlarged and improved. A major development was the installation of a water system and automatic generator which provides power for the pumps, lights, etc. New toilet facilities were erected, the existing cabin was enlarged by the addition of a bed and bathroom, plus an office. A shower and lavatory were installed in one end of the garage and an elevated trail constructed from the new and attractive gatehouse to the thatched "chickee" where the boardwalk begins. Midway of the boardwalk a shelter has been erected so that visitors caught in rain showers will not be obliged to retrace their way to the headquarters area. At no time in its history has the sanctuary seen so much activity and progress. During much of the construction period it was closed to the public (though not to the tours) and was re-opened January 19, 1960. A charge of one dollar per visitor over 12 years of age was instituted which helps meet the cost of maintenance. From that date to the end of April more than 7,000 people visited the sanctuary, exclusive of the members of the tours. That visitors will increase in the future is inevitable, for the word will get around and more and more



Baby limpkin photographed by Allan D. Cruickshank.

Strangler fig on cypress.





Pileated woodpecker photographed by Allan D. Cruickshank.

Cypress knees.



people will want to see the last of the East's big trees. The sanctuary is open every day *except Mondays*.

From the casual visitor to the specialist in any branch of natural sciences, Corkscrew Swamp is a veritable magnet. Botanically, it is bewildering in its luxuriant abundance, from the immense trees themselves down to the diminutive flowers of the jingle-bell orchid and the tiny, round leaves of the floating duck-weed. One is almost overwhelmed by the profusion of living plants of which the cypresses are the crowning glory.

There is but one species, the bald cypress, or *Taxodium distichum* of botanists; however, there is a variety, or subspecies, which is much smaller, more slender, and with different foliage that grows along the edges of the "strands." It is known as pond cypress, *Taxodium distichum nutans*. This is the form seen in such abundance along the western portion of the Tamiami Trail. Instead of the feathery foliage of the larger trees, that of the pond cypress consists of small overlapping scales, appearing more like needles than leaves. It should be remembered, too, that the cypress is a deciduous conifer, which loses its foliage in winter when the trees look stark and bare, and at a time when most visitors to Florida see it. Hence the name "bald" cypress, and also the impression made on many people that they are looking at great numbers of "dead" trees, which, of course, are not dead at all, but simply leafless.

Another unique character of the tree is the existence of the protuberant growths about the base of the trunk known as "knees." These are bark-covered projections from a few inches high to as much as three or four feet. They are rounded or conical, produce no foliage, do not grow into trees, and their function is yet in dispute. One theory is that they are "breathers" for the root system from which they grow, another is that they lend structural support to the roots.

The cypress is a slow-growing tree and cannot be propagated as pines or others are. Many of them in the Corkscrew are 200, 400, and 600 years old. The gigantic specimen surrounded by the boardwalk is very nearly 700 years old, thus putting



Wild hibiscus.

Strap fern.



its "birth" back to about 1260 A.D., some 232 years before Columbus came to America. No wonder the trade name among lumbermen for the tree is "The Wood Eternal."

Among the most interesting and certainly the most abundant of growths in the swamp are the air-plants. They belong to the pineapple family and there are but two genera; these, however, contain several species. Most of them are of the genus *Tillandsia*, the other is *Ca-topsis*. They do indeed look like pineapple plants at a glance and grow both on the trunks and on the branches of trees. They are the objects which so many visitors take for birds' nests in the cypresses along the Tamiami Trail and elsewhere. In the spring, bright red clusters appear among the spiky leaves which many observers take to be the flowers of the plant. Actually they are not, but are the bracts, from which small, tubular blue flowers come out, adorned with yellow anthers.

One of the *Tillandsia* air-plants is the Spanish "moss" about which great misconceptions are entertained by a great many people. It is considered by them to be a parasite and fatal to trees. It is not a parasite and it does not kill trees. A very heavy growth of these air-plants may, at times, shade out some leaf growth and may, when heavy with wetness, break off a small limb but other than that, it does no harm to a tree. Some of these trees, 500 to 700 years old, support quantities of moss and are still healthy and thriving.

Ferns of the Corkscrew are present in almost incredible abundance. Of the many species which grow there, the huge leather fern is the most spectacular as its fronds may reach a length of from 10 to 12 feet. These look and feel much like leather. Great clumps of royal fern appear atop old knees and stumps, and Boston, swamp, shield, and strap ferns grow there luxuriantly. One of the most interesting is the resurrection fern which grows along the limbs of trees and, when dry, appears twisted, gnarled, and dead. Yet, 30 minutes after a shower it springs into green beauty, which has given rise to its common name.

→
A rustic boardwalk takes the visitor 3,555 feet into the Emerald Kingdom.





Although they are overshadowed by the cypress, other trees are plentiful in the swamp. The large clumps of trees to the right and left of the boardwalk at First Lettuce Lake, which look so gnarled and twisted, supporting luxuriant air-plants and orchids, are custard apple. The fruit is edible. Red bay, swamp maple, and pop-ash are others. The huge leaves of the fire-flag are almost everywhere, and blue-flowered weed and white-flowered arrowhead are abundant. The ribbed water-lettuce and duck-weed, one of the smallest of flowering plants, form carpets in the lagoons and wooded areas. Ghostly spider lilies gleam whitely against the heavy shadows, contrasting sharply with

the flaming brilliance of the huge blossoms of wild hibiscus.

On many of the trees are great cable-like aerial roots which entwine the trunks in close embrace. This is the weird and sinister-appearing tree, the strangler fig. Often starting at the top of a cypress from a bird-borne seed, it sends down the long aerials which finally become rooted in the soil. Smaller trees such as the palms are often enveloped and choked by this formidable growth.

The swamp's orchids are among its most fascinating plants. These exotically famed growths, so queer in blossom and structure, have been considered unique in the world of

botany. Most of the Corkscrew orchids bloom in summer so that the winter visitor is denied sight of the flowers, but now and then one can be seen in winter and spring. Probably the best known and most easily identified species is the cigar, or cow-horn, orchid, *Cyrtopodium punctatum*. The flowers are borne in clusters on a long stalk and are yellowish, spotted with brown. It blooms in April and is quite spectacular. The onion, or butterfly, orchid, *Epidendrum tampense*, is the commonest and derives its names from onion-like, pseudo-bulbs from which long, narrow dark green foliage springs. Its greenish-brown flowers with a

Some alligators reach 14 feet in length.



white lip and rosy center bloom in May and June.

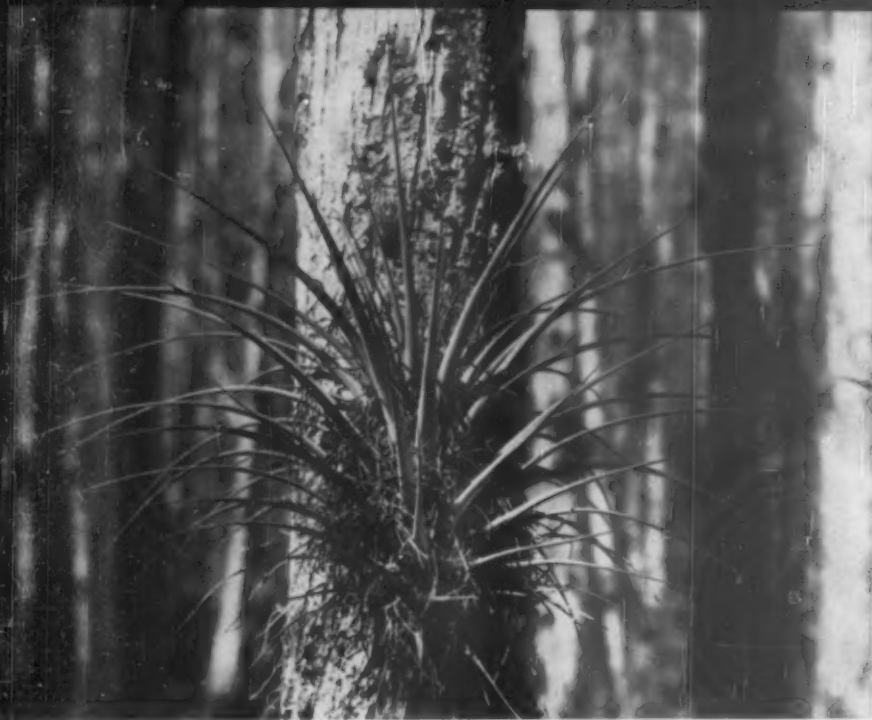
The night-smelling orchid, *E. nocturnum*, produces beautiful white blooms which are fragrant only at night. Although September and October are the best times to see them, they sometimes appear in mid-winter. One of the most interesting and certainly the most inconspicuous of the orchids is the jingle-bell, *Harrisella porrecta*. One can walk by within two feet of it and never know it is there. It is simply a group of slender, grayish roots adhering to a branch, without any leaves whatever. Tiny white blooms appear in September, followed by oval seed-pods which resemble "jingle-bells." The flowers are of pin-head size, and it is the smallest of the orchids.

Somewhat like it but much larger is the strange ghost orchid, another leafless species which looks like a great spider clutching the trunks of trees. It is about the size of a dinner plate and in summer bears white flowers with a long, trailing lip. Fin-

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Great blue heron photographed by Allan
D. Cruickshank.

Florida otter photographed by Hugo H.
Schroder.



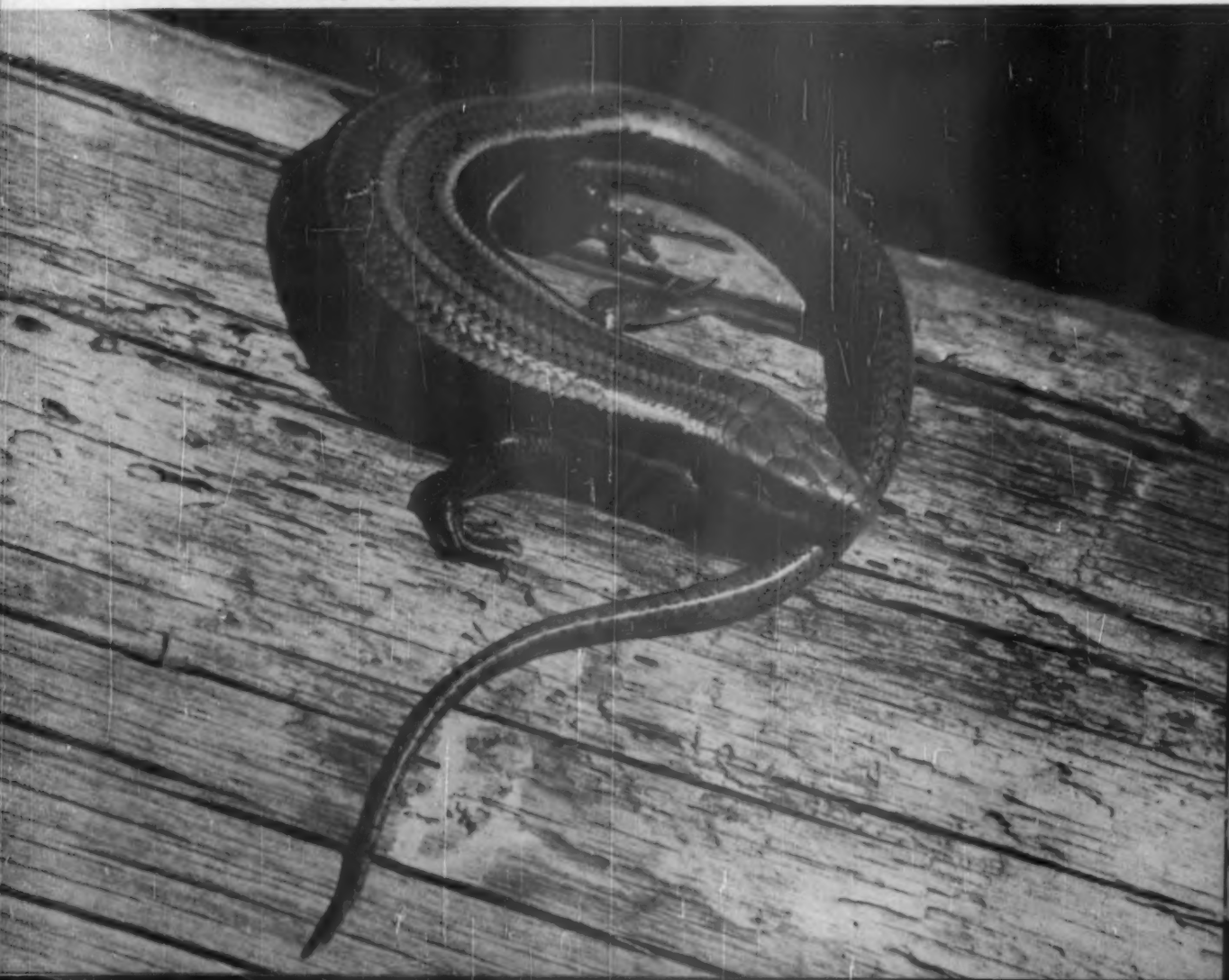


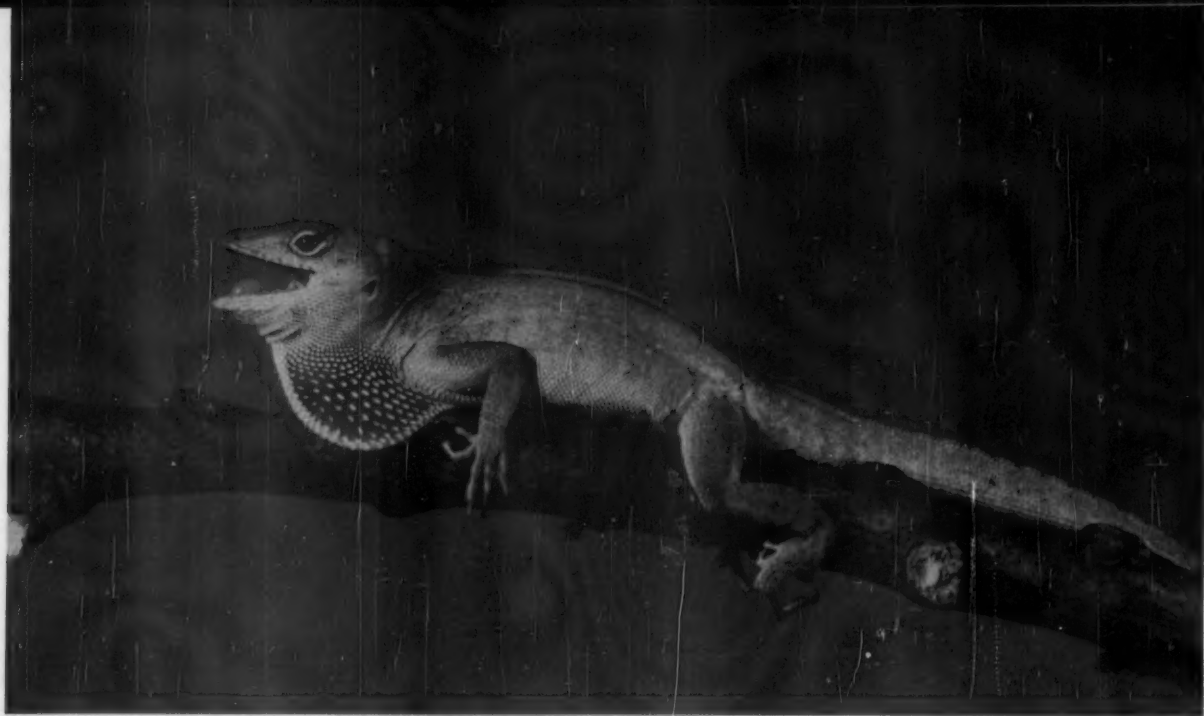
Common air plant, *Tillandsia fasciculata*.

ally, the shell orchid, *E. cochleatum*, appears on tree-trunks, its tufts of bright green resembling a broad-bladed grass. The flowers come out in fall and are yellowish with a purple lip.

The birdlife of the Corkscrew reaches a dramatic climax in the ancestral colony of wood storks, or wood ibises, which nest in mid-winter in one part of the swamp or another. The season of 1959-1960 was wonderful for visitors as many nests could be seen from the boardwalk from December through April. These created much interest among both the public and the Audubon Tour members. Activity among the wood storks went on at all hours and the birds in the colony numbered some 4,700 pairs. An excellent "crop" of young was raised. American and snowy egrets, great and little blue herons, and Louisi-

Five-lined skink photographed by Leonard Lee Rue, III.





Chameleon photographed by Robert C. Hermes.

Fire flags, *Thalia geniculata*.

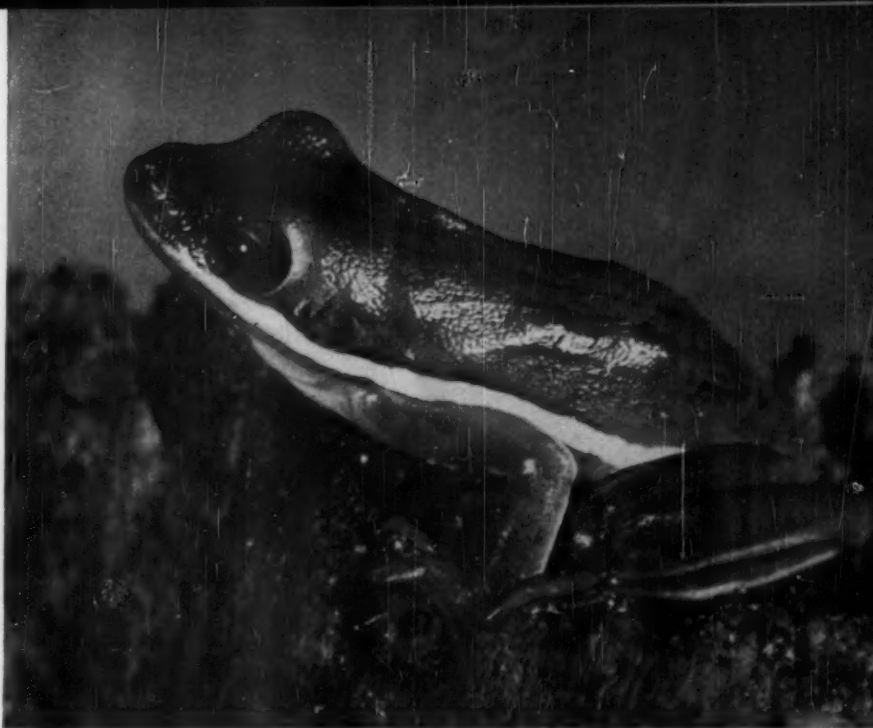




Cougar photographed by Leonard Lee Rue, III.

ana and little green herons are often seen in the swamp. Because of the *Pomacea* snails that live in Corkscrew, the limpkin lives there also. It can often be seen feeding on the snails, which it extracts from the large greenish shells with its bill and without chipping the shell. Piles of the shells can sometimes be seen at a favorite feeding spot. In the spring, broods of the downy black young limpkins may be seen following the parents about. White ibises visit the lettuce lakes occasionally and, in spring, the exquisite swallow-tailed kite soars above the cypresses.

Pileated and red-bellied woodpeckers make the swamp vocal, also resident barred owls which often call by mid-afternoon. Small resident birds are the tufted titmouse, Carolina wren, cardinal, towhee, and blue-gray gnatcatcher. Red-shouldered hawks remain the year around. Small migrants are sometimes abundant, sometimes scarce, depending on weather conditions and the sea-



South Florida green tree frog photographed by Dade Thornton.

Fallen cypress log plays host to ferns.

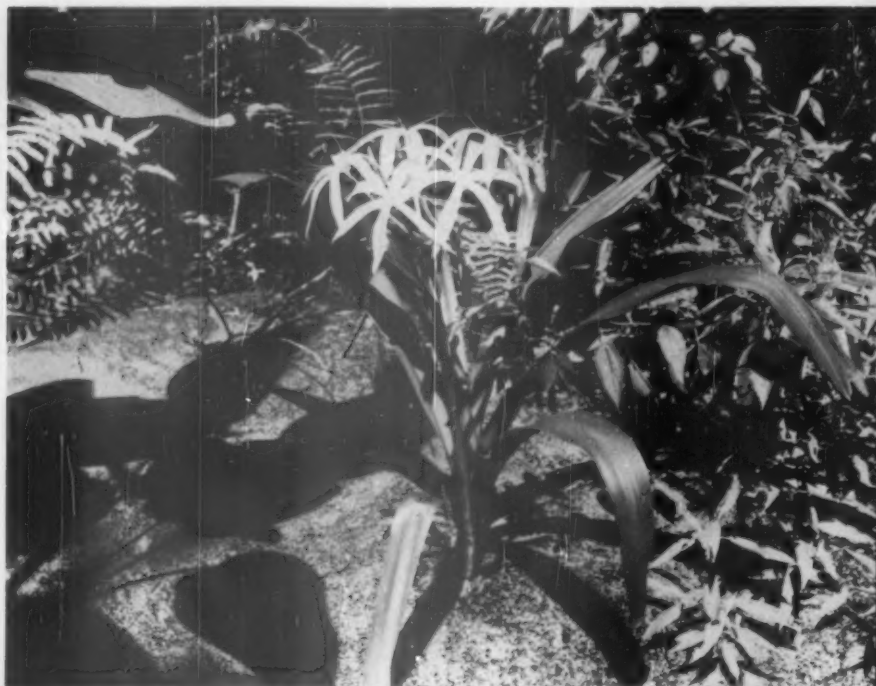




Red-bellied woodpecker photographed
by Edwin J. Howard.

Swamp lily, *Crinum americanum*. →

Shell orchid, *Epidendrum cochleatum*.



son. These are warblers, thrushes, vireos, and tanagers, with many others. In winter the yellow-throated, black-and-white, prairie, and palm warblers are in the swamp.

Among the reptiles the alligator can be seen practically every day in the year. From 12 to 14 feet long, they range down to very small ones, and many have become so accustomed to people on the boardwalk that they remain at very close range on logs or tussocks of plants that project above the water. Chameleons that scurry along the deck and rail-

ing of the boardwalk change color momentarily and show the red fan-like protuberance of the throat. Five-lined skinks run about occasionally, and one of the outstanding field marks is the bright blue tail.

Few snakes are seen but they are there—cottonmouth moccasin, diamond-backed rattlesnake, black-snakes, water snakes of several kinds, ribbon snakes, and fox snakes.

There are gray and fox squirrels in the swamp—the fox squirrels very large and showing a white nose and ears. Otters are quite often seen,

sometimes on the boardwalk itself. Bobcats, or bay lynx, are common in the area but so shy that a glimpse of them is not often had. Deer live around the swamp edges, raccoons are common, and the panther, or cougar, still exists in the general region.

With all the animate and inanimate life which the Corkscrew presents, the paramount impression of any observer of this fascinating area is the gratifying conviction that what one sees has *always* been there and *always* will be. It is a breath of the primeval, a majestic remnant of what once was a great portion of the southeastern United States. The National Audubon Society is dedicatedly determined to preserve it for posterity.

—THE END

Story of Bird Anting

By David Gunston*

Part II

DURING the period 1954 to 1957, anting entered the arena of scientific controversy as many more highly curious facts emerged from the United States, Canada, Denmark, and Britain. In 1954 the Swiss ornithologist Holger Poulsen averred that "the bird tries to avoid squirting from the ants while eating them, so therefore the significance of anting is the rubbing off and/or avoiding of irritation." This theory had earlier been rejected by most naturalists as it did not explain the use of other stimulants (now reaching an astonishing variety, including millipedes, lime-rind, mealworms, *Rhynchota* bugs, sumac berries, and very many times, smoke). Yet, such a distinguished authority as Sir Julian Huxley at once acclaimed Poulsen's statement as "a definitive solution to one of the outstanding puzzles of ornithology," a premature judgment, to say the least. In the following year, the British naturalist Derek Goodwin, working in his Surrey aviary with tame jays, which regularly anted with the wood ants he offered them, and with collared doves and golden pheasants which consistently refused to do so, came up with six detailed reasons for his belief that anting "is a very distinctive behaviour pattern," unconnected in any way with feeding. His notes were to arouse much subsequent controversy, and in 1956 Poulsen again told in print of his experiments involving 152 individual birds of 24 families and 85 different species, of which birds of 56 species of 15 families actually performed "this amazing antic." He showed that birds discriminated against the various ant species, and concluded that the desire to ant is "released by irritation and tactile stimuli on the skin." The belief that only passerine, or perching, birds anted was refuted in 1957 by

Mrs. L. M. Whitaker in the United States, reporting in *The Wilson Bulletin*. Out of her then exhaustive list of birds known to ant, 148 species in all, 16 were not perching birds.

A particularly interesting series of amateur experiments was next reported in the English magazine *The Countryman* in 1958. K. E. L. Simmonds told how he and his wife had actually crushed various species of ants in their mouths and noted their own reactions to them. Even with the largest live ants they discovered that little or no sensation of any heat was created, but a quite characteristic and not unpleasant taste was produced in every case. This confirmed an earlier contention of H. Roy Ivor in the *National Geographic Magazine* (1956) that some ants secrete pleasant-smelling liquids from their bodies, not formic acid.

Gradually, however, the importance of heat was being further realized. Then came the astonishing disclosures of Dr. Maurice Burton of the London Natural History Museum, first as press articles in the *Illustrated London News* and the *Sydney Morning Herald* (1955-1957), and subsequently in his remarkably interesting book "Phoenix Re-born" (1959). Working with tame European jays and especially with his pet rook "Niger," Dr. Burton was able to explore very fully the close relationship between anting and the stimulus offered birds by heat—through smoke, fumes, and actual flames. "Niger" not only rubbed a lighted match he was offered inside his wing-feathers, but when straw was set alight near him he "literally leaped on the flames, and, almost literally, wallowed in them." "Niger's" ritual fire-dancing had tremendous stimulatory enjoyment for him, and Dr. Burton, in a generally undogmatic work, feels that there can be no doubt that "the fascination exerted by the flames and that exerted by ants are related; the posture assumed by the bird, and the way it behaves, are identical in both instances." He conjectures that perhaps this behavior of

certain birds in the presence of smoke or flames is an explanation of the always puzzling phoenix legend.

Still the records of new species anting come in. Some unusual additions are a great horned owl (reported by Farley Mowat as having the odd pastime of tearing apart anthills and fluffing up the dust and the angry ants into its feathers), a raven, tanagers, waxbills, an emu (which used bees from a hive), a thornbill, satin bower-birds, landrails, kingfishers, and a spotted-sided finch (which used cigarette ends).

From his extensive knowledge of anting reaching back to the beginning of our real awareness of it as a bird problem, Chisholm examined in turn each of the various theories put forward to explain its origins and purpose. The earliest idea of food carriage, i.e., putting ants inside the plumage to carry away for later consumption, he dismissed as highly improbable and bearing no relation to true anting. The suggestion that anting might be merely food cleansing, the birds energetically wiping the insects before eating them, was also dismissed, for only live ants are used, as well as many other substances, often inedible. The skin cleansing theory, with the ants used for the destruction or repulsion of parasites on the skin or plumage, he believes may have something in it, though he thinks it is not the chief reason for anting. Doubtless ants will devour small parasites on occasion; it is known that in India and elsewhere natives will spread lousy garments upon anthills, to collect them some time later thoroughly cleansed of vermin. Chisholm feels, however, that to believe birds deliberately seek out ants and use them to rid their bodies of lice is to credit birds with too much intelligence. *Odor attraction*, with birds obviously enjoying pungent aromas of various kinds, including possibly formic acid, is a factor of importance, though our knowledge of it remains sketchy. It is not clear how much is due to a sense of smell, believed

* Mr. Gunston is a writer in natural history subjects who lives in England. Readers will remember his previous articles in *Audubon Magazine*—"Do Birds Have a Sense of Smell?" published in November-December 1958 issue; "Do Animals See Colors?" March-April 1959 issue; and "What is Hibernation?" November-December 1959 issue.—The Editor

BIRD FINDING WITH *Sewall Pettingill*



WHERE TO GO • WHEN TO GO • WHAT TO SEE

WHEN I was gathering information for my "Guide to Bird Finding East," Everglades National Park was quite undeveloped, having just been established (1947). In view of the vast improvement made in the park since the book's publication (1951), my description of the area is now inadequate. The following account includes personal observations obtained on a visit in February 1960:

Everglades National Park embraces more than 2,100 square miles of flat, low-lying terrain that is nowhere higher than 10 feet, together with countless fresh-water channels and sloughs. The interior is largely sawgrass country—open prairies or "glades," flooded during the summer rains and often ravaged by fire as spring approaches. Here and there, where the elevation is slight, loom many tree islands. The majority are "bayheads," comprised of low stands of bay, holly, and magnolia over which grow innumerable vines forming a thick tangle. Their appearance is often dome-shaped because the trees tend to increase in size toward their centers. The other islands are "hammocks," best described as dense, moist, jungle-like forests whose trees support a lush epiphytic flora consisting of orchids, bromeliads, ferns, and other air

plants. The trees themselves are mostly large and represent many broad-leaved varieties of West Indian derivation. Besides the tree islands, the "only other forested places in the park are the pinelands, restricted to a few limestone elevations. From the sawgrass country southward and westward to the coast stretch the mangrove swamps—impenetrable thickets of low mangroves,* some deeply rooted in wet saline soils, others in tide-washed flats or in salt-water shallows.

To reach the entrance of Everglades Park from Homestead, you drive south to Florida City on U.S. Route 1, turn west on State Route 27, and follow directional signs. From the park entrance a paved road traverses the park for 39 miles to Flamingo on Florida Bay. Along the park road in the winter you are almost certain to see red-shouldered and sparrow hawks, yellow-shafted flickers, and an abundance of common crows, eastern meadowlarks, red-winged blackbirds, and boat-tailed grackles. You may also observe a few sandhill cranes. By late February you have a good chance of seeing swallow-tailed kites, which return from their southern wintering grounds to

*Editor's Note: Extensive damage was done to the mangrove forest by Hurricane Donna in the fall of 1960. Miles of shoreline mangroves were killed.

nest, then depart the following fall.

Your first stop in the park should be the Royal Palm Area, sometimes called Paradise Key, two miles from the entrance. This is a fine example of a hammock, with a luxuriant growth of vegetation, including majestic royal palms (found in only a few places elsewhere in the park), live oaks with epiphytic orchids, and giant leather ferns. Pileated woodpeckers frequent the dead live oaks and barred owls can often be heard calling during the day. The truly unique attraction of Paradise Key, if not the park, is the Anhinga Trail. I know of no other place, except a zoological park, that offers such close views of alligators and so many different species of water and marsh-loving birds, exclusive of waterfowl.

Anhinga Trail runs for about a half mile from the Visitor Center, past a pond, along an old road grade paralleled by water-filled ditches, and on an elevated boardwalk. From the pond to the end of the boardwalk the trail passes a variety of watery habitats, some dominated by sawgrass, others by tall, dense shrubs, and still others by emergent herbaceous plants that include water-lilies with huge pads. The variety of habitats is only one of the factors contributing to the trail's uniqueness. No less important are the great abundance of fish and aquatic invertebrates which provide a generous supply of food for birds, and the daily, almost steady stream of human visitors. Lured to the vicinity of the trail by food, and gradually accustomed to human movements, the birds stay to feed and loiter, ignoring the people.

There's no denying that bird watching on the Anhinga Trail is plush but I must say that, from it, you can learn far more about feeding habits and general activities of certain bird species in a short while than you can by skulking through marshes and swamps and peering through blinds and telescopes for days. Here the birds are right before you, unafraid, and behaving as though you were not there. Picture-taking opportunities are limitless—they can't be beaten.

We spent two days—yes, two days—taking motion pictures from the trail. And we could have spent many more profitably. When we ar-

rived the first morning, I thought some special event had been scheduled. The parking lot was nearly full; there must have been a hundred people on the trail; along the road-grade ranged a line of photographers using every conceivable camera from a Brownie to the most expensive with the longest of telephoto lenses. A few cameras were directed at snoozing alligators, the rest at the birds. And no wonder!

Across the ditch, 10 feet from some of the cameramen, an American bittern stalked its prey, now and then thrusting its beak in the water and coming up with a shiny fish. In all my life, I had never watched this shy marsh-dweller feed. At about the same distance from other cameramen a Louisiana heron went through similar maneuvers. And then a little blue heron arrived. Naturally I joined the line, burning up film.

Trying to take pictures along this part of the trail was like photographing a three-ring circus. Following one bird, we discovered another doing something more interesting, then another doing something still better. Common and snowy egrets, green herons, white ibises, and an occasional limpkin—all of them were performers here. And there was almost always an anhinga or two, sitting on the bushes, with wings spread in the sun.

No doubt the stellar ornithological attractions of the trail are the gaudily colored purple gallinules, seen from the boardwalk. We watched them walking confidently over the lily pads, their long thin toes never for a moment letting them sink into the water. There are common gallinules too. These more somberly arrayed birds, though possessing similarly long toes, seem more inclined to swim among the lily pads than "snowshoe" over them.

The boardwalk terminates in a wide observation platform overlooking a big pool frequented by pied-billed grebes, American coots, belted kingfishers, and occasionally wood storks and great blue herons.

If you wish to take motion pictures and have time to watch for repeated actions of individual birds, you can sometimes get remarkable sequences. For example, I noticed that a snowy egret's favorite spot for

fishing was beside the road-grade but, owing to human traffic passing so near, the bird patronized it only when there was a lull. I set up my camera, focused on the spot, and waited. As soon as the people stopped passing, the bird arrived and hurriedly caught fish that had gathered during its absence. Seeing the episode on the screen, someone will doubtless remark, "That was a lucky shot!" Then we discovered a king rail hiding in a clump of grass across the ditch. Every so often, when the human traffic subsided, it passed slowly across an open space to a neighboring clump, usually feeding as it went. The traffic stopping again, it returned to the first clump, and so on, with each lull. To film the bird, all I had to do was wait for the traffic to cease. As any bird finder or photographer knows, it isn't often that you see a rail in the open.

Besides Paradise Key, there are several other stops worth making on your way to Flamingo. Mangrove Trail will give you a quick introduction to a mangrove thicket. West Lake, on the east side of the road about 30 miles from the park entrance, should be looked over for ring-necked ducks and other waterfowl. There are always rafts of coots. Coot Bay, on the west side of the road, about midway between West Lake and Flamingo, is a good place for egrets, herons, and ibises, particularly in the early morning and the late afternoon.

Flamingo, which overlooks Florida Bay from just east of Cape Sable, southernmost tip of the Florida mainland, had a Visitor Center with an excellent restaurant, a museum, and such national park services as guided tours and regular evening programs by naturalists.* Flamingo Lodge, a new, 60-room motel, had rates that are most reasonable when compared to charges for similar accommodations elsewhere in Florida. In the busy winter season, you must make reservations well in advance by writing the Everglades Park Company, 3660 Coral Way, Miami 45, Florida.

At low tide the mud flats off Flamingo attract many shorebirds

* Editor's Note: Hurricane Donna destroyed much of the Flamingo installation. Reconstruction has proceeded swiftly, however, and by the time this article is read the facilities may be open to the public again.

including long-billed curlews and marbled godwits, while the open prairie and thickets to the west of Flamingo are undoubtedly the best areas in the park for landbirds—bald eagle, osprey, peregrine falcon, pigeon hawk, an occasional short-tailed hawk, and many unusual wintering passerines. Unfortunately the Cape Sable sparrow no longer occurs near Flamingo.

While at Flamingo you should go to Bear Lake which lies to the northwest and is accessible by two miles of wilderness road.* Ask one of the park naturalists for specific directions. The road is closed to most cars, so you should plan on walking. Shallow and surrounded by mangrove jungles with intervening channels and sloughs, Bear Lake invariably features large numbers of white pelicans, common egrets, snowy egrets, Louisiana herons, little blue herons, and white ibises, together with smaller numbers of anhingas, great white herons, wood ibises, and roseate spoonbills. We saw all of these species from the point where the road terminates at the lake. In addition, we noted many red-breasted mergansers and a few lesser scaup ducks, and also heard prairie warblers singing in the mangroves. The evening flights of the birds across the Lake were most impressive.

To fully appreciate the enormous concentrations of herons, ibises, and other wading birds in Everglades Park, you cannot do better than take one of the three Audubon Wildlife Tours, scheduled in winter and early spring. These two-day trips by station wagon and boat, begin and end in Miami and all include a stop at the Anhinga Trail and a cruise from Bear Lake to Gator Lake.** Two of the tours view a nesting colony of roseate spoonbills in Florida Bay and the third features a cruise to the tremendous rookery of egrets and wood ibises on an island in Cuthbert Lake. For information about the tours, write to the Florida office—the National Audubon Society, 143 N.E. 3rd Avenue, Miami 32, Florida.

* Editor's Note: The road to Bear Lake was also blocked by Hurricane Donna but may possibly be open now.

** Editor's Note: Damage from Hurricane Donna prevented the Bear Lake and Gator Lake tours this season, at least temporarily. A cruise through the Snake Bight shoals, thick with bird-life, was substituted and proved rewarding.

AVAILABLE FIELD CHECK-LISTS OF BIRDS — CANADA AND THE UNITED STATES

Daily Field Check-Lists

"Check-lists" are lists of the species of birds that ornithologists and amateur bird watchers have compiled for a number of years from their observations within a limited geographical area. Although such a check-list might include all of North America, for example, "The A. O. U. Check-List of North American Birds," a large volume which includes the scientific and common names of each species and their nesting and wintering ranges, the daily field check-lists are local and much simpler. They are small, usually pocket-size, printed on cardboard or heavy paper, and list the common names of the birds known to occur in the area, with a blank space alongside the name of each bird where the observer can make a check mark to indicate that he saw the species. There are also blank spaces for the name of the observer, date of the field trip, period of time in the field, weather, exact locality, and usually space for additional notes.

Bird watching, bird listing, and bird study are usually local, there-



fore the local list, which tells the watcher what he may expect to see within a limited area, is a valuable guide. The lists of the check-lists that follow, their prices, and where one may get them, were prepared especially as a service to our readers, many of whom take long trips each

year to see birds in localities new to them.

We are grateful to all of the individuals of bird clubs, natural history groups, and government organizations who cooperated by sending us check-lists in response to our published request.—JOHN K. TERRES

CANADA

Alberta:

"Check-list of the Birds of the Calgary Region," 10 cents each, E. D. Beacham, Secretary-Treasurer, Calgary Bird Club, 342 42nd Street, S.W., Calgary, Alberta.

British Columbia:

"Bird Check List: Victoria and 20-Mile Radius," 10 cents each, The Provincial Museum, Victoria, British Columbia.

"Check List of the Birds of Manning Provincial Park 1960," free, Mr. J. E. Underhill, Dept. of Recreation and Conservation, Victoria, British Columbia.

New Brunswick:

"New Brunswick Birds Field Check-List 1959," 5 cents each, New Brunswick Museum, Saint John, New Brunswick. "The Birds of New Brunswick," (160 pp.), \$2.00, New Brunswick Museum, Saint John, New Brunswick.

Ontario:

"Field-Checking List (1959)" (bird spe-

cies recorded within a 30-mile radius of Toronto, and revised each year), 5 cents each, Royal Ontario Museum, 100 Queen's Park, Toronto, Ontario.

Quebec:

"Field-Checking List—Birds of Quebec" (in English and French), 15 cents a dozen; \$1.00 per hundred, Editor, *Le Bulletin Ornithologique*, 35 du Jardin, Orsainville, Quebec.

Saskatchewan:

"Field-Checking List of Saskatchewan Birds," Yorkton Natural History Society. No price listed. Write to Fred G. Bard, Provincial Museum, Normal School Building, Regina, Saskatchewan.

UNITED STATES

Alabama:

"Field Check List of Alabama Birds," prepared by Alabama Ornithological Society, 2 cents each, B. E. Dean, 2100 20th Avenue, South, Birmingham, Alabama.

"Birds of Sumter County, Alabama." No price listed. Write to Mr. Jenkins Jackson, Livingston, Alabama.

"Birds of the Wheeler National Wildlife Refuge," leaflet, single copy free. U. S. Fish and Wildlife Service, Washington 25, D. C.

Alaska:

"Birds of the Aleutian Islands National Wildlife Refuge"; "Birds of the Kenai National Moose Range"; "Birds of the Kodiak National Wildlife Refuge." Leaflets, single copies free. U. S. Fish and Wildlife Service, Washington 25, D. C.

Arizona:

"Salt River Valley, Arizona, Field Check List," five cents each, Salome Ross Demaree, Maricopa Audubon Society, 148 West Rose Lane, Phoenix, Arizona.

"Birds of the Cabeza Prieta Game Range"; "Birds of the Kofa Game Range." Free, U. S. Fish and Wildlife Service, Washington 25, D. C.

Arizona-California:

"Birds of Havasu Lake National Wildlife Refuge," and "Birds of the Imperial National Wildlife Refuge," free leaflets. U. S. Fish and Wildlife Service, Washington 25, D. C.

Arizona-New Mexico:

"Field List of Birds of Southwestern New Mexico and Southeastern Arizona," two cents each. Dale A. Zimmerman, 1011 West Florence Street, Silver City, New Mexico.

Arkansas:

"Field List of Arkansas Birds 1960." Five cents each. Mrs. John F. Rea, Arkansas Audubon Society, 5212 H Street, Little Rock, Arkansas.

"Field Check List Birds of Fort Smith and Vicinity." Free, write Ruth Armstrong, 1106 North 14 Street, Fort Smith, Arkansas.

"Birds of Big Lake National Wildlife Refuge," and "Birds of White River National Wildlife Refuge." Free leaflets, U. S. Fish and Wildlife Service, Washington 25, D. C.

California:

"Birds of Saint Mary's (Berkeley) College Area." Free. Arthur S. Campbell, 3011 Regent Street, Berkeley 5, California.

"Habitat Check List of the Vertebrates of Contra Costa County," 50 cents each. Diablo Valley College, Golf Links Road, Concord, California.

"Check-List of Birds Death Valley National Monument, Inyo County, California." Price 10 cents, and "Checklist of Birds of Pinnacles National Monument, San Benito County," free. Write to: Roland "Ro" Wauer, Park Naturalist, Death Valley, California.

"List of the Birds of Monterey Peninsula Region," 10 cents. Mrs. G. P. Lamont, The Monterey Peninsula Audubon Society, Route 3, Box 882, Carmel, California.

"Distribution of Birds in the Redwoods." Free. Big Basin Redwoods State Park, Santa Cruz County or Division of Beaches and Parks, Office of Natural History and Conservation, 1125 Tenth Street, Sacramento 14, California. "Checklist of Birds of Sacramento and Vicinity." 25 cents each. Mr. Fred G. Evenden, Sacramento Audubon Society, 1717 Professional Drive, Sacramento, California.

"Birds of the Sacramento National Wildlife Refuge," and "Birds of the Salton Sea National Wildlife Refuge." Free leaflets. U. S. Fish and Wildlife Service, Washington 25, D. C.

"Common Birds of Garden, Park, Forest, and Chaparral of San Francisco Bay Region," 10 cents. Prepared by Sequoia

Audubon Society, Mrs. Marion Norman, Publicity Chairman, 656 Cedar Street, San Carlos, California.

"Field Check List of the Birds of Santa Barbara County, California." Five cents each, plus 4 cent stamp for postage. Santa Barbara Museum of Natural History, 2559 Prieta del Sol, Santa Barbara, California.

"A Study List of the Most Commonly Seen Birds of Southern California," 5 cents each. "Annotated Field List of the Birds of Southern California," 1953, no price listed. Write to Los Angeles Audubon Society, 7377 Santa Monica Boulevard, Los Angeles 46, California.

"Birds of Yosemite." No price listed. Special issue of Yosemite Nature Notes, August 1954, Box 545, Yosemite National Park, California.

California-Oregon:

"Birds of the Klamath Basin National Wildlife Refuge." Free leaflet, U. S. Fish and Wildlife Service, Washington 25, D. C.

Colorado:

"Check-List of Birds of Colorado." 10 cents each. Order from Dr. Robert S. Stabler, Colorado College, Colorado Springs, Colorado.

"Check List of Colorado Birds." 10 cents each. Order from Inez Baker, 411 Lincoln Street, Longmont, Colorado.

"Birds of the Monte Vista National Wildlife Refuge." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

Connecticut:

"Check List of the Birds Seen in the Vicinity of Hartford, Connecticut." 75 cents. Order from Hartford Bird Study Club, Inc., 950 Trout Brook Drive, West Hartford, Connecticut.

Delaware:

"Birds of the Bombay Hook National Wildlife Refuge." Free leaflet from U. S. Fish and Wildlife Service, Washington 25, D. C.

District of Columbia:

"Check-list of Birds of the District of Columbia Region." Perforated to fit notebook, or plain, 1 cent each. "A Field List of Birds of the District of Columbia Region," 35 cents. Order both from Audubon Naturalist Society of the Central Atlantic States, Inc., Box 202, Benjamin Franklin Station, Washington 4, D. C.

Florida:

"Check List of Florida Birds." 3 cents each. Order from Florida Audubon Society, P.O. Box 821, Maitland, Florida. "Field Card of Florida Birds and Their Status in the Tallahassee Region," 2 cents each. Order from H. M. Steven-

son, 905 Briarcliff Road, Tallahassee, Florida.

"Birds of Northeastern Florida." Two for 5¢. Order from C. H. Ekdahl, Halifax River Audubon Society, Box 1246, Daytona Beach, Florida.

"Check-list of Birds of Pinellas (St. Petersburg) Area." No price listed. Write to Mrs. Frank G. Smith, 2401 — 68th Avenue South, St. Petersburg, Florida.

"Check-list of Birds for Sanibel-Captiva Area of Lee County, Florida." 35 cents. Order from Mr. William MacIntosh, c/o Sea Horse Book Shop, Sanibel Island, Florida.

"Birds of the Chassahowitzka National Wildlife Refuge"; "Birds of the Lower Florida Keys"; "Birds of the Loxahatchee National Wildlife Refuge"; "Birds of the Sanibel National Wildlife Refuge"; and "Birds of the St. Marks National Wildlife Refuge." Free leaflets, U. S. Fish and Wildlife Service, Washington 25, D. C.

Georgia:

"Birds Most Commonly Seen in Georgia." Free leaflet. Order from Mr. W. A. Gresh, Regional Director, U. S. Fish and Wildlife Service, Peachtree-Seventh Building, Atlanta 23, Georgia.

"Birds of the Atlanta Area," single copies free. Order from Mr. Tom Colum, Atlanta Bird Club, 1070 Lucile Avenue, S.W., Atlanta 10, Georgia.

"Field Check-List of Georgia Birds, Ida Cason Callaway Gardens." Free. Order from Winslow Shaughnessy, Ida Cason Callaway Gardens, Pine Mountain, Georgia.

"Floyd County Audubon Society Field Check List." 10 for 25 cents. Order from Chairman, Sales Committee, Floyd County Audubon Society, Rome, Georgia.

"Birds of Sea Island, St. Simons Island and Glynn County." Free. Order from Sea Island Company, Sea Island, Georgia.

"Birds of the Okefinokee National Wildlife Refuge"; "Birds of the Piedmont National Wildlife Refuge"; and "Birds of the Savannah National Wildlife Refuge." Free leaflets. U. S. Fish and Wildlife Service, Washington 25, D. C.

Hawaii:

"Check List and Summary of Hawaiian Birds." No price listed. Write to Books About Hawaii, Honolulu 5, Hawaii.

"Hawaiian Birds." No price listed. Write to Hawaii Audubon Society, Box 5032, Honolulu 14, Hawaii.

Idaho:

"Birds of the Camas National Wildlife Refuge"; and "Birds of the Deer Flat National Wildlife Refuge." Free leaflets. U. S. Fish and Wildlife Service, Washington 25, D. C.

Illinois:

"Field Check List of Illinois Birds," prepared by the Illinois State Museum. Two for 5 cents; 15 for 25 cents; 65 for \$1.00; 100 for \$1.50, and "A Distributional Check List of the Birds of Illinois," 25 cents each. Order both from Illinois State Museum Society, Centennial Building, Springfield, Illinois.

"Birds of the Chicago Area," \$2.75 a hundred; 30 cents for ten, postpaid. The Book Shop, Chicago Natural History Museum, Chicago 5, Illinois. "The Chicago Academy of Sciences, Field Card of the Birds of the Chicago Area." Academy of Sciences, 2001 N. Clark St., Chicago, Illinois. No price listed.

"Birds of the Chataqua National Wildlife Refuge," and "Birds of the Crab Orchard National Wildlife Refuge." Free leaflets. U. S. Fish and Wildlife Service, Washington 25, D. C.

Indiana:

"Check-list of Indiana Birds." 1 cent each; in lots of 100 or more, add postage. Order from Mabelle M. Snow, Treasurer, Indiana Audubon Society, 2211 Chester Boulevard, Richmond, Indiana.

"Status of Birds in Tippecanoe County" (1957). Free. Order from Irving W. Burr, 1141 Glenway, West Lafayette, Indiana.

Iowa:

"Iowa Distributional Check-List." Reprint from Iowa Bird Life. 25 cents each. Order from Dr. J. H. Ennis, Cornell College, Mount Vernon, Iowa.

"Iowa Ornithologists' Union Field Checking List." 3 cents a copy. Order from Dr. Myrl Burke, Route 2, Waterloo, Iowa.

"Polk County Check-List." No price listed. Order from Miss Mary E. Peck, Treasurer, Des Moines Audubon Society, 3839 Cornell, Des Moines 13, Iowa.

"Birds of Union Slough National Wildlife Refuge." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

Kansas:

"Check List of Birds: Pittsburg, Kansas, and Vicinity." Free. Order from Dr. John C. Johnson, Jr., Department of Biology, Kansas State College, Pittsburg, Kansas.

"Hand-List of the Birds of Kansas," and "Directory to the Bird Life of Kansas." No prices listed. Write to Museum of Natural History, The University of Kansas, Lawrence, Kansas.

"Birds of the Kirwin National Wildlife Refuge." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

Kentucky:

"Kentucky Ornithological Society Check List of Kentucky Birds." 15 for 25 cents. Order from F. W. Stamm, Secretary, 2118 Lakeside Drive, Louisville 5, Kentucky.

"Birds of the Kentucky Woodlands National Wildlife Refuge." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

Louisiana:

"Field Check-List of Louisiana Birds." 8 cents each; \$2.75 for 50; \$5.00 for 100. Order from Museum of Zoology, Louisiana State Museum, Baton Rouge, Louisiana.

"Birds of the Delta National Wildlife Refuge"; "Birds of Lacassine National Wildlife Refuge"; and "Birds of the Sabine National Wildlife Refuge." Free leaflets. U. S. Fish and Wildlife Service, Washington 25, D. C.

Maine:

"Enjoying Maine Birds." \$1.45. Booklet published by the Maine Audubon Society, Portland Museum of Natural History, 22 Elm Street, Portland, Maine.

"Birds of Moosehorn National Wildlife Refuge." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

Maryland:

"Birds of Maryland and the District of Columbia." \$1.75 a copy. Paper-backed bulletin, North American Fauna 62. Order from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

"Birds of the Blackwater National Wildlife Refuge." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

Massachusetts:

"Birds of the Andover Region." Reprint from the Bulletin of the Massachusetts Audubon Society, \$1.00 each. Order from Oscar M. Root, Brooks School, Andover, Massachusetts.

"Check List—Birds of Martha's Vineyard." No price listed. Write to Richard M. Sargent, 20 Vesey Street, New York 7, New York.

"Connecticut Valley Check List." 2 cents each. Order from Glenn A. Weeks, 218 Plain Road, Greenfield, Massachusetts.

"Daily Field Card." 35 for \$1.00. Order from Massachusetts Audubon Society, 174A Newbury Street, Boston 16, Massachusetts. "Daily Field Card for the Springfield Region." 5 cents each. Moreton R. Bates, President, Allen Bird Club, 282 Gillette Avenue, Springfield, Massachusetts.

"Field-List of the Birds of Essex County, Massachusetts." 35-cents each; 3 for \$1.00. Peabody Museum, Essex Street, Salem, Massachusetts.

"Birds of the Great Meadows National Wildlife Refuge"; "Birds of Monomoy National Wildlife Refuge"; and "Birds of the Parker River National Wildlife Refuge." Free leaflets. U. S. Fish and Wildlife Service, Washington 25, D. C.

Michigan:

"Birds of the Seney National Wildlife Refuge." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

Michigan-Ontario (Canada):

"A Field List of Birds of the Detroit-Windsor Region." 50 cents. Cranbrook Institute of Science, Bloomfield Hills, Michigan.

Minnesota:

"Birds of the Minneapolis-St. Paul Region." 25 cents each. Minnesota Museum of Natural History, University of Minnesota, Minneapolis 14, Minnesota.

"Minneapolis Audubon Society Field List of Minnesota Birds." Two for 5 cents. Order from Mrs. R. E. Whitesel, Book Service Chairman, Minneapolis Audubon Society, 5707 Bryant Avenue, Minneapolis 19, Minnesota.

"Birds of the Mud Lake National Wildlife Refuge"; "Birds of Rice Lake National Wildlife Refuge"; and "Birds of Tamarac National Wildlife Refuge." Free leaflets. U. S. Fish and Wildlife Service, Washington 25, D. C.

Mississippi:

"Birds of Noxubee National Wildlife Refuge." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

Missouri:

"Birds of the St. Louis Area." 50 cents. Order from Miss Alberta M. Bolinger, Secretary, St. Louis Audubon Society, Apartment 106, 5079 Waterman, St. Louis 8, Missouri.

"Burroughs Club Field Card Kansas City Area." 10 for 25 cents. Order from Miss Rilla Hammat, 4829 Holmes, Kansas City, Missouri.

"Birds of the Mingo National Wildlife Refuge"; "Birds of the Squaw Creek National Wildlife Refuge"; and "Birds of the Swan Lake National Wildlife Refuge." Free leaflets. U. S. Fish and Wildlife Service, Washington 25, D. C.

Montana:

"Montana Bird List." Free. Museum of Vertebrate Zoology, Montana State College, Bozeman, Montana.

"Birds of the Bowdoin National Wildlife Refuge"; "Birds of the Medicine Lake National Wildlife Refuge"; "Birds of the National Bison Range"; "Birds of the Ninepipe and Pablo National Wildlife Refuges"; and "Birds of the Red Rock Lakes National Wildlife Refuge." Free leaflets. U. S. Fish and Wildlife Service, Washington 25, D. C.

Nebraska:

"Daily Field Record of Nebraska Birds." Two for 10 cents. "Revised Check-list of Nebraska Birds." \$1.00 each. Order both from Miss Bertha C. Winter, 1004 E. Street, Lincoln 8, Nebraska.

"Birds of Valentine National Wildlife Refuge." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

Nevada:

"Birds of the Desert Game Range"; "Birds of Ruby Lake National Wildlife Refuge"; and "Birds of the Stillwater Wildlife Management Area." Free leaflets. U. S. Fish and Wildlife Service, Washington 25, D. C.

Nevada-Oregon:

"Birds of the Sheldon National Antelope Refuge." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

New Hampshire:

"New Hampshire Birds—Yearly Check List." 5 cents; 12 for 50 cents. "Summer Residents of the Connecticut (N.H.) Lakes Region." Free. Order both from Mrs. Vera Hebert, New Hampton, New Hampshire.

"Check-List of Birds Commonly Found in the Hanover, N. H., Vicinity." Free. Order from Mrs. E. A. Sherard, 27 East Wheelock Street, Hanover, New Hampshire.

"A List of the Birds of New Hampshire." \$1.00. Audubon Society of New Hampshire. Order from Mrs. Merlin W. Noyes, 36 Coles Street, Lakeport, New Hampshire.

"Guide to Summer Birding in the Connecticut Lakes Region." 75 cents. Order from Massachusetts Audubon Society, 174A Newbury Street, Boston 16, Massachusetts.

New Jersey:

"300 Birds Occurring in the Middle Atlantic States." No price listed. New Jersey Audubon Society, 790 Ewing Avenue, Franklin Lakes, New Jersey.

"Annotated List of the Birds of High Point State Park and Stokes State Forest." No price established. In preparation by Sussex County Bird Club. Order from Dryden Kuser, Box 67, Sussex, New Jersey.

"Birds of the Brigantine National Wildlife Refuge." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

New Mexico:

"Check-list of the Birds of Santa Fe, New Mexico." Fifty for \$1.75. Order from Michael Hamilton, P.O. Box 535, Santa Fe, New Mexico.

"Check-list of the Birds of Clayton, New Mexico, Vicinity." 25 cents each. Order

from Adolf J. Krehbiel, 221 Jefferson Street, Clayton, New Mexico.

"Birds of Bitter Lake National Wildlife Refuge"; "Birds of Bosque del Apache National Wildlife Refuge"; "Birds of the Burford Lake Wildlife Management Area"; and "Birds of the San Andres National Wildlife Refuge." Free leaflets. U. S. Fish and Wildlife Service, Washington 25, D. C.

New York:

"Alan Devoe Bird Club Check List, Columbia and Rensselaer Counties." No price listed. Write to: Mrs. Donald F. Radke, Bird Records Chairman, Box 138, R. R. 1, East Chatham, New York.

"Birds of Central New York Recorded from the Cayuga Lake Basin." Three for 10 cents. Order from Laboratory of Ornithology, Cornell University, Ithaca, New York.

"Birds of the Central Finger Lakes Region." Two for 5 cents. Order from Miss Doris Bowen, Secretary, Eaton Bird Club, 517 South Main Street, Geneva, New York.

"Birds of Rockland County and the Hudson Highlands." \$1.15 a copy includes postage and handling. Order from The Rockland Audubon Society, West Nyack, New York.

"Birds of Ulster County." 30 cents. Write to Mr. Fred Hough, Research and Records Committee, John Burroughs Natural History Club, Accord, New York.

"Check-List of Birds of Lewis, Jefferson, and St. Lawrence Counties, New York." 20 cents each. Order from Arthur W. Allen, President, North Country Bird Club, 561 Eastern Boulevard, Watertown, New York.

"Genesee Ornithological Society Field Report." Free. Order from Alfred A. Starling, President, 34 Pinnacle Road, Rochester, New York.

"Onondaga Audubon Society Field Check List of Birds." Single copies free. With request send your stamped, self-addressed envelope to Dr. Ben Burt, 109 Hafenen Road, Syracuse, New York.

"Preliminary Annotated Checklist of New York State Birds." 20 cents a copy. New York State Museum and Science Service Department, Albany 1, New York.

"Triple Cities [Binghamton, Johnson City, and Endicott, New York] Naturalists' Club Field Bird Report." Free in small quantities. With request, send a stamped, self-addressed envelope to Leslie Bemont, 710 University Avenue, Endwell, New York.

"Birds of the Elizabeth Alexandra Morton National Wildlife Refuge [eastern Long Island]." Free Leaflet. U. S. Fish

and Wildlife Service, Washington 25, D. C.

North Carolina:

"Birds of Pea Island National Wildlife Refuge." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

"Birds Reported at High Hampton Inn, Cashiers, North Carolina." Free. Write to Mrs. R. D. Barton, High Hampton Inn.

North Carolina-South Carolina:

"Birds of the Carolina Sandhills National Wildlife Refuge." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

North Dakota:

"Birds of the Arrowwood National Wildlife Refuge"; "Birds of Long Lake National Wildlife Refuge"; "Birds of the Souris Loop National Wildlife Refuge"; and "Birds of the Slade National Wildlife Refuge." Free leaflets. U. S. Fish and Wildlife Service, Washington 25, D. C.

"Check List of North Dakota Birds." (Article appeared in *Wildlife in North Dakota*, 1955 issue.) Availability unknown. Write to North Dakota Game and Fish Department, Bismarck, North Dakota.

Ohio:

"Cleveland Museum Bird Check List." No price listed. The Cleveland Museum of Natural History, Cleveland, Ohio.

"Columbus Audubon Society Field Trip Record" (Central Ohio). 2 cents each. Order from Mrs. Arthur S. Kiefer, 86 Erie Road, Columbus 14, Ohio.

"Dayton Audubon Society Field Check List." (Dayton Area). 2 cents each. Order from Dayton Audubon Society, 2629 Ridge Avenue, Dayton 14, Ohio.

"Southwestern Ohio Check List." No price listed. Order from Emerson Kemises, Curator of Ornithology, Department of Biological Sciences, University of Cincinnati, Cincinnati 21, Ohio.

"Toledo Naturalists Association Field Trip Record." Send stamped, self-addressed envelope and a 4-cent stamp for each copy desired to Mrs. Helen Baehren, Route 1, 10455 West Bancroft Street, Holland, Ohio.

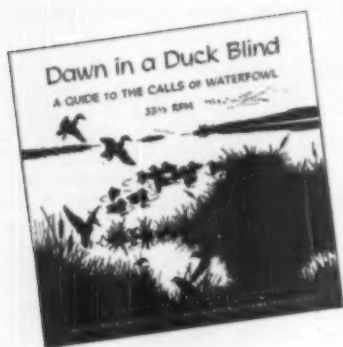
Oklahoma:

"Birds of the Salt Plains National Wildlife Refuge," and "Birds of the Wichita Mountains Wildlife Refuge." Free leaflets. U. S. Fish and Wildlife Service, Washington 25, D. C.

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Continued on page 62



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Attracting Birds



Choice Foods that Attract Birds in Winter in the Southeast

By Verne E. Davison
and Roy A. Grizzell*

WHAT foods attract a bird most dependably to a feeder, garden, field, pond, woodland, or anywhere else? Soil conservationists need clear and practical answers to the question, because many people ask their assistance in planning land use, and in establishing plants for one or more species of birds.

Much is known about bird foods, but more knowledge is useful. Past studies lead us to believe that: (1) A "choice" food is one that is attractive and nutritious to a species, and is eaten readily and regularly wherever the food can be made available; (2) a fair food is eaten only during severe storms, or when choice foods are no longer available; and (3) a food which is never taken in more than minute quantities may be considered "unimportant" for that species of bird. We have used this classification successfully to separate the choice foods, which are worth planting or feeding, from the fair foods that usually are not worth any costly effort.

We conducted a series of food studies with songbirds at our homes at Athens, Georgia, and Avondale Estates (near Atlanta), Georgia, from early January to late April 1960. Most of the foods we tested were cropland seeds furnished us by the courtesy of the Pennington Grain and Seed Company, Madison, Georgia, including the foods they put in their commercial mix for feeding wild birds. Several other foods that are commonly available or are fed to birds were also tested and evaluated. Each food is discussed separately, naming the birds that ate it well enough to label it a "choice"

* Biologists of the Soil Conservation Service at Athens and Atlanta, Georgia, respectively.

food, and those that selected it as only "fair." We have noted a few items that are "extra-choice" where this additional classification has merit.

The birds that came repeatedly to feed in our yards, at our feeders, or in the vicinity are listed in Table 1.

Methods of Testing Bird Foods

At Athens, the foods were offered birds separately, several at a time, at irregular intervals of a week or two. Separate piles of a handful or more were placed on the ground about three feet apart, and in varied arrangement patterns to obviate any selection by birds because of their position. Many of the food items also were offered off-the-ground at feeders of various kinds. Suet was placed in baskets fastened to trees or placed on a birdhouse feeder. Peanut butter was put into a shallow plastic dish and placed on the platform of a feeder. Rendered ham fat was in a shallow dish on the platform of a feeder. Sunflower seeds, broken peanuts, or pecan meats were tested on the ground and in chickadee-type swinging feeders. Pie crust, white bread, cookies, cake, and sunflower seeds were taken readily from a window sill, also, by the chickadees, nuthatches, titmice, and pine warblers.

At Avondale Estates, the seed-eating birds were fed in a compartmented window-shelf feeder. A suet-and-peanut butter mix was placed in crevices of the bark on pine trees. Multiflora rose and pyracantha, heavily fruited, grew in the yard.

One or more choice foods were made available every day so that no "starvation" condition ever existed for any species. For the grain eaters, commercial scratch feed (cracked corn, grain sorghum, and wheat) was offered daily.

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For the eaters of oily and fatty foods, large-seeded sunflowers, suet, or peanut butter (usually all three), were made available to them every day. For fruit-eaters, only raisins were offered birds in addition to the multiflora rose, pyracantha, and a few holly berries that were available on bushes in our yards and those of our neighbors.

The natural setting at Athens was a newly-developing residential section, heavily wooded along the Little Oconee River, outside the city of Athens. Natural foods available nearby in the fall (October to December) included box elder, flowering dogwood, American hophornbean, acorns of post and water oak, seeds of loblolly, shortleaf, and Virginia pine, common ragweed, and sycamore. Within a mile were hollies, privets, multiflora rose, and other ornamental shrub fruits. There had been late summer and early fall fruits such as black gum, silky dogwood, wild grapes, hackberry, and persimmon, but these were gone during the feeding trials. We mention these natural foods because we noticed, during the last three years, that in a six to eight week period, from late October into December, our cardinals and other resident birds stopped coming regularly to our scratch feed which was a choice food all the rest of the year. This indicates natural availability of some "extra-choice" foods at this season of general food abundance—a condition which had been verified at Auburn, Alabama, and at Spartanburg, South Carolina.

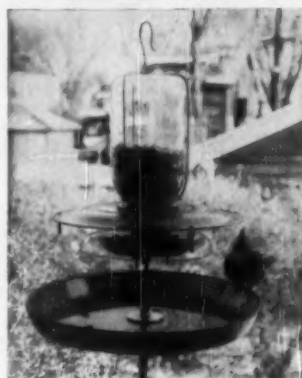
The Foods

Beech (*Fagus grandifolia*). The staminate flowers of beech were a choice food at Athens for white-throated sparrows—eaten eagerly April 15 to 18 by the same birds that also fed daily on choice grains. It could not be verified that any other birds fed on the beech flowers, certainly not in the choice category anyway. Nor were white-throats seen to feed on any other flowers.

Bread. As many others have noted, white bread or biscuit is a choicer food than any other bread (corn, rye, or whole wheat). It is a choice food of cardinals, chickadees, blue jays, juncos, sparrows—field, house, and white-throated—titmice, towhees, pine warblers, and red-bellied woodpeckers.

Browntop millet (*Panicum ramosum*). This proved to be a choice food of cardinals, mourning doves, purple finches, juncos, and of chipping, field, fox, house, song, and white-throated sparrows, and towhees. (Browntop, we found in other studies, is also a choice food of the red-winged blackbird, bobwhite, indigo bunting, brown-headed cowbird, ducks—black, mallard, mottled, pintail, ring-necked,

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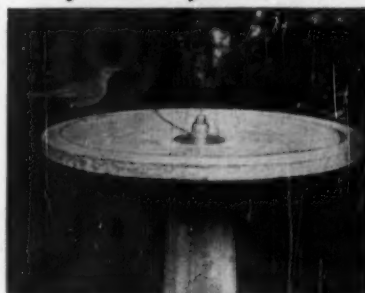
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blue-winged teal, and wood—and eastern meadowlark.

Buckwheat (*Fagopyrum sagittatum*). Choice food of purple finches.

Canarygrass (*Phalaris canariensis*). The seed of this grass is imported and sold to feed birds. It proved to be a choice food of cardinals, mourning doves, purple finches, goldfinches, juncos, and sparrows—chipping, field, fox, house, song, and white-throated.

Chinaberry (*Melia azedarach*). These berries in the areas studied are evidently an unimportant food to robins. The fruits are left unused most years, even where flocks of robins are present in winter and spring.

Clover, crimson (*Trifolium incarnatum*). None of our birds would eat the seeds of this large-seeded clover.

Corn (*Zea mays*). Corn is an extra-choice food of many birds. To understand its use, we must deal with it in four forms—ear corn, whole grain, cracked, and ground corn (meal). From these feeding trials, and other related studies, the following classifications are warranted: *Ear corn* is a choice food, eaten readily by wild ducks and wild geese. Edward Sullivan, Soil Conservation Service Biologist, Grenada, Mississippi, permits us to include his 1960 findings that common grackle, blue jay, and red-bellied woodpecker take the grain from the ear corn, too. *Whole grains* of corn are swallowed by bobwhites, mourning doves, ducks, Canada geese, ring-necked pheasants, domestic pigeons, lesser prairie chickens, and wild turkeys. The whole grain is also a choice food of cardinals and common grackles which chew the grain apart; and of blue jays and red-bellied woodpeckers which take the whole-grain and break it by hammering with their bills. *Cracked corn* is choice food of cardinals, brown-headed cowbirds, mourning doves, purple finches, blue jays, juncos, sparrows—chipping, field, fox, house, and white-throated—brown thrashers, towhees, and red-bellied woodpeckers. It was a fair food for eastern bluebirds during a storm period from March 2 to March 12. *Cornmeal*, including check-size or similarly ground corn, is choice of the same birds that liked cracked corn, and includes, in addition, the pine warbler. It was evident that all of our birds prefer the coarsely ground corn over cracked corn; except blue jays and red-bellied woodpeckers which prefer cracked corn and the whole grains.

Cottonseed meal. No bird or squirrel ate it, even when other foods were temporarily unavailable.

Eggs, hard-boiled. Though the hard-boiled yolk has been fed by other investigators to captive young birds, our adult winter birds nibbled only a little. We have to say, "unimportant."

Grapefruit seeds. Nothing ate them—in a single test.

Holly, American (*Ilex opaca*) and Chinese holly (*Ilex cornuta*) appeared to be a choice food of mockingbirds, but only a fair food of eastern bluebirds, robins, and cedar waxwings.

Millet, Texas (*Panicum texanum*). This is a close relative of brown-top millet, and was a choice food of juncos and sparrows—chipping, field, and white-throated—at the Avondale Estates.

Nandina (*Nandina domestica*). The red fruits of this ornamental shrub are only fair, eaten sparingly by mockingbirds, robins, and cedar waxwings.

Oat groats (*Avena sativa*), seeds hulled but not broken. Choice food of cardinals, mourning doves, purple finches, juncos, sparrows—chipping, field, fox, house, song, and white-throated—and towhees.

Oatmeal (rolled oats). Nothing ate it dry; but on one occasion, after a rain turned the meal into a pasty mush, field sparrows ate it as a choice food. Other choice grain was available close by.

Okra. None of the birds ate okra seeds fed at Athens.

Peanut (*Arachis hypogaea*). We did not try them in the hull. Our trials included (1) Spanish peanuts raw, (2) Spanish peanuts cooked and salted, (3) runner peanuts raw, (4) runner peanuts cooked and salted, and (5) peanut butter. Items 1, 2, 3, and 4 were equally acceptable—choice to cardinals, juncos, and towhees. When the peanuts were chopped or broken into smaller bits, they proved to be a choice food also of Carolina chickadees, purple finches, brown-headed nuthatches, field sparrows, tufted titmice, and pine warblers at Athens; however, they were also eaten readily at Avondale Estates by mockingbirds, sparrows—chipping, house, and white-throated—and Carolina wrens. *Peanut butter* was an extra-choice food (in fair weather, or stormy) for Carolina chickadees, field sparrows, tufted titmice, and pine warblers. It proved to be a fair food for eastern bluebirds which ate it only during the record-breaking storms in Athens, Georgia, March 2 to March 12. The purple finches and brown-headed nuthatches never were seen to eat the peanut butter, though they fed all around it every day. (The birds that ate peanut butter seemed to like

cheaper brands as well as the more expensive ones.)

Pearl millet (*Pennisetum glaucum*). Choice food of cardinals, mourning doves, goldfinches, juncos, sparrows—chipping, field, fox, house, song, and white-throated. Surprisingly, towhees refused it consistently.

Pecan (*Carya illinoensis*). Pecans must be considered in two forms—(1) whole and (2) cracked, including the pecan meats. Whole pecans were taken and broke into by blue jays and red-bellied woodpeckers. Pecan meats proved to be choice food of cardinals, Carolina chickadees, goldfinches, mockingbirds, nuthatches, sparrows—chipping, field, white-throated—titmice, towhees, pine warblers, and Carolina wrens. A house sparrow ate some, but not enough to classify.

Photinia, Chinese (*Photinia serrulata*). Flocks of cedar waxwings and local pairs of mockingbirds were observed eating the entire crops of berries in Athens and Avondale Estates, Georgia, and at Auburn, Alabama, and Jackson, Mississippi.

Pie crust. A choice food of Carolina chickadees, nuthatches, titmice, and pine warblers.

Pine, loblolly (*Pinus taeda*) and slash

pine (*Pinus elliotti*). The seeds of these two pines seemed to be equally choice food of cardinals, purple finches, goldfinches, nuthatches, white-throated sparrows, and titmice.

Pokeberry, common (*Phytolacca americana*). Cardinals and mourning doves ate pokeberry seeds readily, a choice food. This test, March 13 to 15, 1960,



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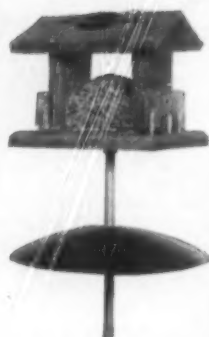
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Privet (*Ligustrum sinense*, *L. lucidum*, and *L. japonicum*). These heavily-fruited, ornamental shrubs or small trees are a chief source of food for cedar waxwings throughout the southeastern states. Davison observed these waxwings feeding on all three species of privet many times in Arkansas, Alabama, Georgia, Mississippi, and South Carolina. They are choice fruits also to eastern bluebirds, purple finches, mockingbirds, and robins; a fair food of cardinals and starlings also. Though the fruits become blue before January, the bird-use is chiefly in January and February.

Proso (*Panicum miliaceum*). This seed, often sold to feed birds, proved to be a choice food of cardinals, mourning doves, juncos, sparrows—chipping, field, fox, house, song, and white-throated—and towhees.

Pyracantha spp. The fruit is a choice food of mockingbirds and cedar waxwings; a fair food of cardinals, blue jays, robins, and house sparrows, according to our observations. However, an occasional *pyracantha* plant has berries which birds eat more readily and earlier.

Ragimillet (*Eleusine coracana*). This seed in repeated trials at both places in April 1960, appeared to be a questionable choice of cardinals, mourning doves, and white-throated sparrows. It was eaten sparingly when better foods were available, but all was eaten after choice grains were temporarily exhausted.

Ragweed, common (*Ambrosia artemisiifolia*). Choice food of cardinals, goldfinches, and slate-colored juncos.

Raisins. A choice food of eastern bluebirds. A fair food of cardinals and field sparrows.

Rape, winter (*Brassica napus*). This seed is often sold in birdfood mixtures. It proved to be a choice food of mourning doves and only a fair food of purple finches, in trials run from late January to mid-March at Athens. Much of the seed was left, and germinated on the ground in April. At Avondale Estates, only one white-throated sparrow ate the rape seed—an inconclusive observation.

Rice, Magnolia and Toro strains (*Oryza sativa*). Both of these varieties, fed as rough seed, were equally choice food of cardinals, brown-headed cowbirds, mourning doves, and field and white-throated sparrows. For rufous-sided towhees, rice may be only a fair food, but needs further testing.

Rose, multiflora (*Rosa multiflora*).

Mockingbirds used rose fruits as a choice food all winter. Almost invariably a pair lives at every multiflora rose fence. The mockingbirds try to drive away the flocks of cedar waxwings that feed on rose fruits. Cedar waxwings feed heavily on multiflora rose, a choice food for them, in February and March—from Georgia to Illinois. In feeding trials on the ground at Athens in March and April 1960, no birds ate multiflora rose fruits. At Avondale Estates, cardinals, robins, and brown thrashers ate the fruit from the bushes—classified as "fair" food. Fox and song sparrows are known to eat the fruits and seeds, too, but we judge the rose to be only a fair food for them. (William B. Stapp, *Audubon Magazine*, May-June 1960, named bluebirds, bobwhites, chickadees, goldfinches, juncos, pheasants, and tree sparrows as feeding on the rose fruits in Ohio—a fair but important food for them in winter emergencies.)

Table 1. The Wildlife Species
that Participated

Common Name	Number at Athens	Number at Avon- dale Estates
bluebird, eastern	4	0
cardinal	more than 20	4
chickadee, Carolina	6	4
cowbird, brown-headed	a pair, 2*	0
dove, mourning	2 to 5	2
finch, purple	6	6
flicker, yellow-shafted	2*	2
goldfinch,		
American	2 or 3*	5
jay, blue	1 to 3	0
juncos, slate-colored	about 15	6
mockingbird	2*	2
nuthatch, brown-headed	4	0
robin	2*	several
sparrow, chipping	?	7
sparrow, field	10 or 12	4
sparrow, fox	about 15	0
sparrow, house	about 8	2
sparrow, song	2 to 4	0
sparrow, white-throated	about 15	5
squirrel, gray	2 to 5	0
starling	0	few
thrasher, brown	1 or 2*	2
titmouse, tufted	6	4
towhee, rufous-sided	4 to 6	4
warbler, myrtle	1*	0
warbler, pine	about 10	2*
waxwing, cedar	flocks	flocks
woodpecker, red-bellied	2*	0
wren	2*	2*

* These came intermittently, not regularly.

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Ryegrass, Italian (*Lolium multiflorum*). Though offered several times, nothing ate the seed in our 1960 experiments.

Sesame (*Sesamum indicum*). Cardinals, mourning doves, juncos, and sparrows—chipping, field, fox, house, and white-throated—ate unpolished sesame seeds as a choice food. On February 18, seven days after polished sesame seeds were available and when better foods were exhausted temporarily, cardinals and white-throated sparrows ate them also as a fair food.

Sorgho, orange cane strain (*Sorghum vulgare saccharatum*). This variety of *Sorghum* proved to be only a fair food of cardinals, mourning doves, juncos, and the sparrows—field, fox, house, song, and white-throated. Though offered repeatedly, it was eaten only after all the choice foods were temporarily exhausted.

Sorghum, grain (*Sorghum vulgare*). Hegari and milo, whole-grains, proved to be choice foods of cardinals, mourning doves, goldfinches, juncos, sparrows—chipping, field, fox, house, song, and white-throated—and towhees. At Avondale Estates, Grizzell determined that titmice ate grain sorghum sparingly—a fair food.

Sudangrass (*Sorghum vulgare sudanense*). This strain of *Sorghum*, proved to be a choice food of cardinals, mourning doves, purple finches, goldfinches, juncos, sparrows—chipping, field, fox, song, and white-throated—and towhees. It appeared to be on a par with the grain sorghums.

Suet, beef. An extra-choice food of Carolina chickadees, nuthatches, titmice, and myrtle and pine warblers. It was just "choice" to red-bellied woodpeckers, and only a fair food of eastern bluebirds and Carolina wrens, which fed on suet only during the severe storms.

Sunflower, giant black and gray varie-

ties, (*Helianthus annuus*). These two varieties were equally attractive: extra-choice food of Carolina chickadees, purple finches, goldfinches, brown-headed nuthatches, and tufted titmice; and choice food of cardinals and towhees. Chipping and field sparrows and pine warblers fed regularly on the tiny bits which they could get from the sunflower hulls that were left on the ground by other birds.

Wheat (*Triticum aestivum*). This was whole-grain wheat, not cracked. Wheat seems definitely less attractive than browntop millet, canarygrass,

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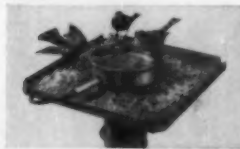
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cracked corn, pearl millet, and proso; but, even so, it must be rated a choice food of cardinals, mourning doves, juncos, sparrows—fox, house, song, and white-throated—and towhees. Gray squirrels also came to feed in these trials. They chose as their choice foods—white bread, corn in all forms, pecans, pine seeds, rice, grain sorghum, sudangrass, sunflower seeds, and wheat.

Summary

We fed and observed about 50 significant kinds of seeds, fruits, nuts, and other food items, to determine each one's attractiveness to the 28 kinds of birds that came to our outdoor feeders during the season of January through April 1960. The species of birds, including winter residents and our year-round birds, are listed in Table 1 on page 52.

The foods are discussed in alphabetical order, naming the birds that ate them, and classifying them as choice, fair, or unimportant. This classification is a significant guide to bird-feeding and habitat management.

Similar studies are being made of bird foods and their use during the fall season, May to December.

—THE END

WREN FOREVER—Continued from page 17

Wren gave a twitch of greeting, and Sweetie fidgeted. Then Wren on his breast, Sweetie standing and twitching her tail, they pecked at the peanut butter. The side-by-side eating was something new to me; up to that year, Wren—and every other male Bewick's wren of my acquaintance—had in winter dominated his mate and taken a lordly first turn at the food.

On the night of December 5, there was a flood of rain. Wren had slept in the hair-lined old nest, just as I had wished he would, while Sweetie spent the nights in an "unfurnished" nest-box in another part of the barn. But Wren must, on getting up, have made his rounds of the hill, as usual falling and putting out his wings, for he was thoroughly drenched when he came to the table.

From 7:30 a.m. to 2:30 p.m., he stayed there. Crouched on a lower rung, he leaned against a leg of the table, eyes closed, the long tail a droopy string. Every 20 minutes or so he roused and went to the top for peanut butter, then returned to the rung, the same spot. When Sweetie came by, I thought she was puzzled at finding her mate so still.

At noon, Wren began to work on his feathers, and with alternate shaking and preening, soon looked quite well. In another hour, he had recovered his confident spirits. Once he drove a chickadee from the peanut butter. Another time he threatened a male cardinal, but cautiously, from the edge of the table, so that he could duck to safety if the larger bird made a hostile move. The cardinal did not appear to see the wren.

December was a rainy month. Many subsequent mornings, Wren arrived wet and cold, to crouch for hours on the lower rung of the table. (I wished that I could rig an electric warmer for that special place.) Never had I seen so many meetings of wren mates in winter. Occasionally Sweetie went down to Wren's rung and sat beside him while she dressed her feathers, for she too was wet, though never as wet as he. Wren did not stir; he did not even open his eyes. But at quite regular intervals he ate suet and nutmeats besides peanut butter, and

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he had the good sense to stay on the porch until late afternoon. I hoped that he then flew straight to the warmly lined nest-box. I thought of caging Wren, even of fitting him with a peg leg, but abandoned both ideas. It was better to let our wren live and die in freedom.

One mild bright day in January, Wren rested on the banister while Sweetie fidgeted at the table. Not moving except to raise his head, the old wren sang the first creaky notes of a song. In February came a long spell of spring-like weather, and then Wren sang the full silvery songs, his voice as beautiful as ever. He was going on six years old; for almost five years he had lived on our hill, and he warned all wrens within hearing that he was the sovereign owner.

Now Wren and Sweetie again roamed together. When they looked at their houses, Wren coaxed with *eeek*. Sweetie replied with the affectionate *plit plit*. Our wren's mate for three winters and two summers, she was "prissy," quite sure of herself. Meeting Wren at the table, she pounced at him in playful flirtation, then skimmed away. And Wren had become wonderfully adept at balancing himself. He pursued Sweetie through thicket and hedgerow, he hurried to her scolds of "Neh-neh-neh," and in the excitement of courtship he flipped his wings and spread his tail to a wide fan.

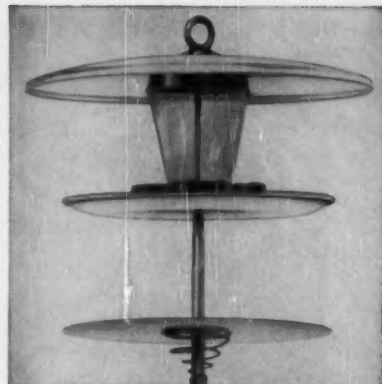
All February was not for songs and courtship. On the 26th, with the temperature at freezing, slow rain started at noon and continued into the night. Next morning, ice coated the trees, bushes, and ground; we had not had such a storm in years. Yet Wren came through that weather with less suffering than on December's rainy days. He arrived dry in the morning and spent the day on the porch, going from table to banister, to the trellis and back to the table. Now and then he settled in the old place on the rung to rest. Back in December, he had not opened his eyes when Sweetie sat beside him, but now it was nearly spring, and merely hearing Sweetie talk above him, Wren rocked with the vigor of "Eek, eek, eek," those witching notes that, perhaps keep a mate's mind on nesting and a future family.

March opened with blue skies and jonquils in golden bloom. Soon Wren would start a nest foundation by carrying twigs to a wren nesting-box. In the hope of making his work easier, I had widened the entrance to every one on the place except the one in which he still spent the nights.

On March 7, Wren failed to come for the breakfast of peanut butter. It was a beautiful day, mild as April, and I told myself that he was carrying twigs. Nevertheless, I felt uneasy, and set out with our Scottish terrier to find him.

Far across the pasture, bluebirds were chattering alarm. I heard a chickadee's fast "Dee dee dee" and then, distinctly, a wren's "Neh-neh-neh." We cut straight over to the brushy corner. One bluebird still scolded from the top of a tree and slate-colored juncos flew out of the briars along the stone wall. I watched the wall. The Scottie, sniffing for rabbits, would scare up Wren and Sweetie, but no wren flew out to hop and twitch and scold.

I searched the barn and then the fences and walls around the ten



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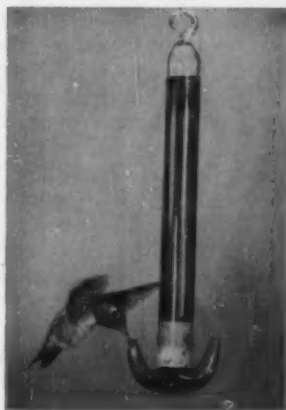
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acres, and came, at last, to a great clump of greenbrier near the mail box. Often I had met the wrens there when I went for the mail. Now Sweetie peered from the tangle. "Sweetie, where is our Wren?" She flew to a tree, scolding the dog.

All the rest of the day, I listened and watched. No silvery songs. Neither *cek* nor *plit plit*. Several times Sweetie came for peanut butter, each time alone and silent. Still, I would not believe that Wren was missing. He wanders, I said, but he will come home to sleep. After dark, I went to the barn and turned a flashlight into Wren's house, but no wren fluffed in the old nest.

And so, I thought, Wren's story ends as many another wild bird's story has ended. For all of them, the pattern is the same. First, there's the day he does not come to the familiar places, then my anxious waiting and watching, and after many days, the dull certainty that he will never return. Then, one day, there was a returning. March had not run out when another Bewick's wren came to our hill to sing the silvery songs and to live as Wren had lived. For those who love individual birds and get to know them, we never really lose them, for, to us, Wren still lives in every other bird of his kind.

—THE END

STORY OF BIRD ANTING—Continued from page 41

to be very limited in many birds, or to sensations from the skin, much as we ourselves enjoy a massage or a Turkish bath. This brings us to what Chisholm feels is probably the main reason, quoting the latest evidence which still supports it, namely *skin stimulation*. Formic acid is probably a prickly stimulant to bird skins; its pleasing effects probably meet a real need. This seems also to explain the use by birds of steam, ashes, cigarette- and cigar-ends, smoke, flames, etc., and justifies the very important matter of the ants used. Experiments have shown that birds invariably reject ants which have apparently lost their thermogenic properties, as when dead, dried, or deep-frozen. There is also some evidence that anting may be a form of auto-intoxication with a sexual significance. Auto-eroticism, common amongst mammals, is not unknown amongst birds. Domestic parrots are frequently addicted to it, and it is perhaps significant that the ants are usually placed by birds on the ventral areas of the body, wings, or tail, rarely on the back, though these may be the areas most affected by parasites.

Whatever its cause, anting can be regarded as a natural phenomenon, engendered by some acute sensory craving by birds which is satisfied only by the convulsive shuddering spasms that result.

What is so hard to explain is the lack of uniformity in the habit. Some individuals of bird species that ant apparently never indulge in the habit, others of ant-eating species also never ant. Why should the

stimulus vary so much? And why should the mere sight of ants send some birds into paroxysms of seeming delight, even if they do not subsequently ant? And is it a fact that aviary birds ant more than wild birds, or is this simply because they are more readily observed? So far, the evidence would suggest that aviary birds ant most.

Anyone seriously interested in this subject should read A. H. Chisholm's exhaustive and up-to-date paper, "The History of Anting," in the May 1959 issue of the Australian bird journal, *The Emu*, which should be available at libraries and museums, and to which the present author is much indebted. Chisholm's final view is as follows:

In my view the general purpose of anting, in its various phases, is the stimulating and soothing of the body, and I suggest that the general effect is similar to that gained by humanity from the use of external stimulants, soothing ointments, counter-irritants (including formic acid), and perhaps also smoking. Further, I suggest that anting has affinity with the impulse of birds to submit themselves to the influences of dust, water, sun, smoke, steam, and air—an impulse which even extends at times into the use of fire.

Others, perhaps, may incline more to the view expressed in 1938 by W. L. McAtee: "The phenomena involved in anting are both remarkable and obscure, and whether we shall ever understand their exact significance is doubtful."—THE END



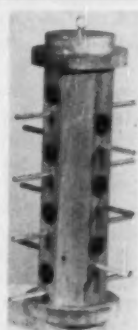
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JAY N. DARLING RECEIVES AUDUBON MEDAL—Continued from page 20

I can think of only one parallel to that vast unthinking army of exploiters. In Regent's Park in London, there is a pair of pampered geese. They take great delight in repeatedly pulling out the stopper of their duck pond, thereby letting all the water drain out of their park reservoir, thus destroying the environment on which their very lives and comfort depend.

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The bronze medal has now been awarded to eight men; in 1947 to Dr. Hugh H. Bennett, at that time Chief of the Soil Conservation Service; in 1949 to Dr. Ira N. Gabrielson, President of the Wildlife Management Institute, formerly Director, U.S. Fish and Wildlife Service; in 1950 to Mr. John D. Rockefeller, Jr., for his great contributions to our system of national parks; in 1952, to Mr. Louis Bromfield; in 1955, to Mr. Walt Disney; in 1956, to Mr. Ludlow Griscom; in 1959 to Dr. Olaus J. Murie; in 1960 to Mr. Jay N. Darling.—Editor

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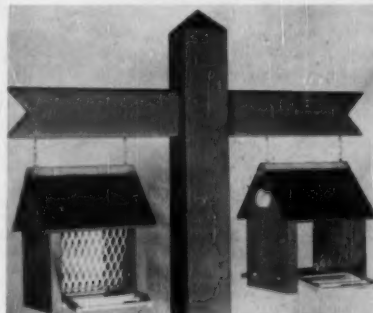
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BOOK REVIEWS



HUMMINGBIRDS

By Crawford H. Greenewalt, with Foreword by Dean Amadon, American Museum of Natural History and Doubleday and Company, Inc., Garden City, New York, 1960. 8¼ x 11¼ in., 270 pp. 70 photographs in full color. \$22.50.

By Robert J. Niedrach*

The author, Crawford H. Greenewalt, and the American Museum of Natural History which sponsored the publication of this wonderfully well-illustrated book, are to be congratulated upon its excellence.

Certainly, author Greenewalt, who is president of E. I. du Pont de Nemours & Co., has set a standard which will be difficult for others to follow. Added to the excellence of his photographs, are the very fine bird drawings of Dale Astle. An unusual feature of the illustrations which, so far as I know, is unique in book publications, is that each shows the bird lifesize. Obviously, hummingbirds are about the only members of the avian world where such treatment would be possible.

The chapter headings are an indication of the wide range of this interesting work. It starts with a foreword by one of the leading ornithologists of the country, Dr. Dean Amadon, and the author presents in his preface an interesting account of the joys and tribulations of nature photography. His field work necessitated traveling some 100,000 miles throughout much of the United States, and to Cuba, Jamaica, Panama, Brazil, and Ecuador. Hummingbirds range throughout much of North and South America and the author had a wide range of subjects to work with—over 600 species and subspecies of some of the most beautiful of all birds. The subject matter of the book is too extensive to attempt to summarize in a brief review, but the chapter headings give an idea of the excellent coverage as follows: Chapter 1, "Behavior and Characteristics"; Chapter

2, "A Photographic Portfolio" (index by plates); Chapter 3, "Feathers, Color and Iridescence"; Chapter 4, "Methods and Equipment."

As hummingbirds are extremely fast-moving, Mr. Greenewalt had to make exceedingly short exposures for his photographs. With the help of the inventor of the high-speed electronic flash, Dr. Harold E. Edgerton, he "tried and discarded many previous designs," finally settling for equipment capable of producing a flash of a "thirty-millionth of a second" duration—a far cry from the usual commercial strobe which ranges from one-six hundredth to two-thousandths of a second. The majority of the photographs were made by remote control, or automatically, when the subject took its own picture by breaking a beam of light shining on a photocell.

This book is truly a work of art. Unless it is being published in a very large edition, it probably will become a rare collector's item.

BIRDS OF NORTH CAROLINA

By T. Gilbert Pearson, C. S. Brimley, and H. H. Brimley, revised by David L. Wray and Harry T. Davis, State Museum, Raleigh, North Carolina, 1959. 7 x 9½ in., 434 pp. Illustrated in color and black and white by Rex Brasher, Robert B. Horsfall, and Roger Tory Peterson. Indexed. \$5.00.

BIRDS OF HAWAII

By George C. Munro, Charles E. Tuttle Company, Rutland, Vermont, 1960. 6¼ x 9¼ in., 189 pp. Illustrated in color and black and white photographs. Indexed. \$4.50.

By John K. Terres

In the first of these two state bird books, long out of print, it is not only good to see this useful volume available again, but prospective buyers will get a real bargain at the price asked for this well-illustrated work. The first edition of "Birds of North Carolina," published in 1919, was out of print by 1942. At

* Mr. Niedrach, Assistant Director of the Denver Museum of Natural History, is an ornithologist and an experienced photographer of birds.

that time another edition was prepared by the same authors (Mr. Pearson was a past president of the National Audubon Society), and the 1942 edition was out of print by 1952. In revising and bringing the 1942 edition up to date, Mr. Wray and Mr. Davis of the State Museum were faced with the problem of how this might be done. In their preface to the 1959 edition they wrote: "With the admiration and respect that came from continued association with the original authors, we sought advice from many others interested in the birds of this area. This brought the conclusion that the scholarly and popular presentation made by Pearson and the Brimleys in the 1942 edition should not be discarded at this time. They had put a lifetime of field work and research into the volume."

Apparently this was a wise decision as the charm of illustration and content of the original book has been retained. To bring it up to date, information about each species, accumulated by field workers since 1942, has been added as a footnote to the original account of each. Accounts of 12 additional ones, recorded in North Carolina since 1942, have been added, which brings the total state bird list to 408 species. Four new color plates and six black and white, all by Roger Tory Peterson, have also been added to the new edition.

"Birds of Hawaii," first published in 1944, has been reissued by a different publisher who apparently has used the offset process to reproduce it. It is good to have this volume in print again, the only available detailed work on Hawaiian birds. It includes the original, capable and comprehensive text, which treats the more than 100 species and subspecies of native Hawaiian birds, 39 non-native species classed as "strays," and 94 introduced species. George C. Munro, since 1920, has been Honorary Associate in Ornithology at the Bernice Pauahi Bishop Museum in Honolulu. He has worked with Hawaiian birds for more than 40 years, and though he modestly states that he is not a professional ornithologist (that is, not employed as such) he demonstrates a professional knowledge of his subjects for which he gives Hawaiian, common English, and scientific names for most, and detailed descriptions, food habits, and much interesting life histories information about native Hawaiian birds, and their decline owing to changes in their environment.

Although some of the 20 color plates are very poor, they should be sufficient to aid in the identification of most of the birds. In reissuing the book, the publisher has done a service to prospective visitors to Hawaii, our 50th state, in offering an illustrated book at a very reasonable price.

WIDEAWAKE ISLAND: THE STORY OF THE B.O.U. CENTENARY EXPEDITION TO ASCENSION

By Bernard Stonehouse, Hutchinson and Co., London, England, 1960. 9 x 6 in., 224 pp. Illustrated with photographs. Indexed. 25 shillings.

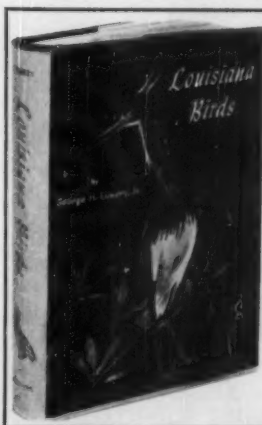
By James P. Chapin*

To commemorate its centennial the British Ornithologists' Union sent two expeditions to study birds on tropical islands, the Comoros in the Indian Ocean and Ascension in the South Atlantic. The present volume gives a most attractive account of varied activities during 18 months on Ascension Island, long an important cable station in mid-ocean, barely eight degrees south of the equator.

With Dr. Bernard Stonehouse, leader, went his wife Sally and five other naturalists. Stonehouse, an Oxford ornithologist, had extensive experience in Antarctica with the large penguins and many other seabirds.

Ascension is well called "Wideawake Island" because it is so famous as the home port of uncounted thousands of sooty terns, there called "wideawakes" because their resonant calls are so often heard at night, and almost imitate that word in our language. Another noteworthy fact is that here the populous "Wideawake Fairs" are re-occupied every nine and one-half calendar months, instead of every 12 months as on islands in other parts of the warm oceans. Ascension has really no changes of season.

* Dr. Chapin is Associate Curator Emeritus of Birds, American Museum of Natural History, New York City. Although mainly a specialist in studies of the birds of Africa (he is the author of the four-volume "Birds of the Belgian Congo"), he has also visited many islands of the tropical Pacific Ocean with seabird colonies like those of Ascension, the subject of the book. In 1942 he was sent by the U.S. Armed Forces to Ascension Island with the special mission of displacing, without killing, the thousands of sooty terns, or "wideawakes," that nested there close to the new airstrip serving American planes bound for Africa. His reports about this were published in *The Auk*, 1954, pp. 1-15; and *The Auk*, 1959, pp. 153-158.



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Ten other species of seabirds, not to mention a few kinds of introduced landbirds, are also inhabitants of Ascension. It was important that their breeding cycles be studied closely, to discover what influences might regulate their periodicity. Some of the seabirds—frigates, boobies, and red-billed boatswain birds—could be found breeding in any month; but the numbers of nests in each case seemed to reach a maximum every 12 months. The nesting seasons of noddies, white terns, and Madeiran petrels were rather more restricted, but recurred at average 12-month intervals. Only the yellow-billed boatswain bird may exhibit a reproductive peak every nine months, but it is not synchronized with the wideawakes' nesting.

Before men came the larger seabirds, like the wideawakes, nested in numbers on the main island of Ascension; but inroads by feral cats and other persecutions now restrict them mainly to adjacent Boatswain Bird Islet. There they were studied at frequent intervals, a task involving some expert seamanship because of heavy rollers.

This informative book also discusses lizards, land-crabs, green turtles, porpoises, and other creatures of the ocean. I recommend it to naturalists of whatever persuasion.

LAND FOR THE FUTURE

By Marion Clawson, R. Burnell Held, and Charles H. Stoddard, *The Johns Hopkins Press, Baltimore, Maryland*, 1960. 9¼ x 6¼ in., 570 pp. Illustrated with graphs. \$8.50.

By Leonard Lee Rue, III*

The authors of this work are employed by Resources for the Future, Inc. Marion Clawson, former director of the Bureau of Land Management of the Department of the Interior, is director of R.F.F.'s land use and management program. R. Burnell Held is an agricultural economist, and Charles H. Stoddard is a forest economist. Combining their talents, this book deals with "the conflict between the demands of an expanding economy and a fixed area of land." Unfortunately, it probably will not be read by the average layman.

The book examines five categories of land use: urban, recreational, agricultural, grazing, and miscellaneous, covering all other uses. Predictions and estimates of land use have been made up to the year 2000. In spite of the fact that urban development, roads, and other non-productive uses are removing several thousand acres of land a day

from agricultural use, the authors see no immediate fear of food shortages caused by the current population boom. Increased productivity will continue, and there will still be plenty for all. Grazing will probably be affected the most as it takes a large amount of land for a small amount of return. As time goes by, more of the products of grasslands will be imported from other countries.

The conflicting programs of some of our federal agencies should be examined more closely. One department spends vast sums draining marshes for agriculture while another department creates marshes and wetlands for wildlife and recreation.

Much of our land can be used for dual purposes. It is estimated that as much as 10,000,000 acres of land will be flooded by the year 2000 to keep pace with our increasing consumption of water. Much of the land used for impoundment of water can be used for flood control, irrigation, hydro-power, food sources, and recreation.

This pattern of multiplicity is going to be a keynote of the future.

THE RACE FOR OPEN SPACE

Regional Plan Association, Inc., 230 West 41st Street, New York 36, N. Y., 1960. 8¼ x 11 in., 95 pp. Illustrated. \$4.00.

By Roland C. Clement*

As communities grew up in medieval Europe, The Commons was an integral part of each. Here, within walking distance of every home, each citizen could graze the family cow, sharing "in common" a pasture reserved for this purpose.

English colonists brought this social institution to America, but as our communities enlarged, cows were relegated to the country and the Commons were expropriated or, rarely, turned into city parks. Boston's famous Commons is a familiar example.

Architects and planners have recently resurrected this useful institution in a new form, the *Residential Commons*, an open area near a cluster of homes, affording breathing space and a touch of greenery, all, again, within walking distance of those it is designed to serve.

This concept can be the salvation of remnants of greenwood, small swamps, brook bottoms, and hillocks in your own expanding community. It is an important recommendation of the many experts who have pooled their talents and experience in this fourth and final report of the Park, Recreation, and Open Space Project committee and staff of the Regional Plan Association of New York City.

* Roland C. Clement is membership director of the National Audubon Society and an experienced ecologist.

No area has suffered more from excessive population growth than New York's metropolitan region; therefore, none is a sorer example of the need for open space. The staggering sums now being expended, and to be expended, to meet barely minimum recreational requirements in this region should serve as a warning to all other communities the country over. The choice we all face is a very simple one: act now even at considerable sacrifice, or pay "through the nose" later—for sooner or later, at whatever price, these social needs must be met.

These reports (see *Audubon Magazine*, September-October 1960) are landmark documents, instructive and encouraging in that they provide solutions, through legal precedent and practical example, to all the community planning problems we lump under open space preservation. This one sums them all up in a call to action. Here is the perfect ammunition for local debates on the issue: the back-to-the-wall conclusions of earnest politicians and the thoughtful deductions of broadly-trained professionals. To go and do likewise may seem like a counsel of perfection, but the crying need is for a sharing of responsibility and more active community leadership by all of us. There has been too much wringing of hands at the desecrations of the bulldozer. In community housekeeping, as in politics, we must admit that we get what we deserve.

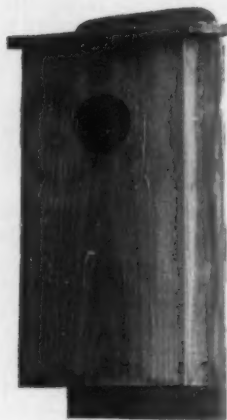
Among many other things, this report tells us:

It is not true that open spaces are voids—their function is to provide livable residential areas, recreation, and the conservation of the total environment. Nor do parks rob the community of taxes—they enhance land values, provide financial stability, often effect a net saving over "development" because every small home requires more in services than it yields the community in taxes.

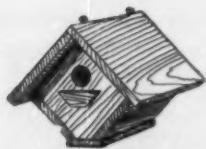
Our job, then, is to stop encroachment on existing park lands, and insist on good community housekeeping through comprehensive planning. It is to buy land now, before prices advance further, and to put off, where necessary, developing recreational facilities till later. Tomorrow can take care of itself, providing we have reserved space. Recourse can be had to public easements, to clustering homes in order to leave open areas (zoning restrictions can be satisfied by "averaging out" the allowed density); to requiring developers to reserve one per cent of any area 50 acres or more for public use, or paying into a community fund a fair fee per lot in lieu of such land reserves, since the community otherwise will have to buy them some day.

* Leonard Lee Rue, III, who is a Camp Ranger for Pahaquarra Scout Camp, at Columbia, New Jersey, is also a well-known natural history photographer, writer, and lecturer. He has spent the last 11 summers as guide and trail director of the Adventure Unlimited wilderness canoe trips in Canada.

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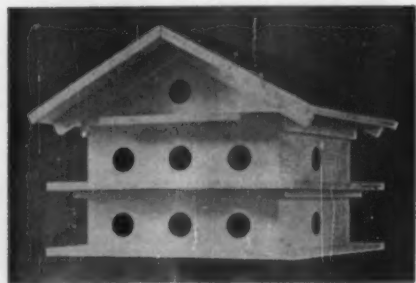
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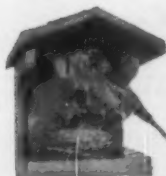
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AVAILABLE FIELD CHECK-LISTS OF BIRDS — Continued from page 62

Virginia-Maryland:

"Birds of the Chincoteague National Wildlife Refuge." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

Washington:

"Birds of the Spokane Region, Spokane Bird Club." No price listed. Write to Mr. Thomas Rogers, East 10820 Maxwell, Spokane 62, Washington.

"Check-list of the Birds of Southeastern Washington, Northeastern Oregon, and Adjacent Idaho." No price listed. Write to Ernest S. Booth, Instructor in Biology, Walla Walla College, College Place, Washington.

"Distribution Check-list of the Birds of the State of Washington." 50 cents. Pacific Northwest Bird and Mammal Society, Seattle, Washington.

"Birds of Turnbull National Wildlife Refuge." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

West Virginia:

"A List of Winter Birds of Oglebay Park," and "A List of Summer Birds of Oglebay Park." No price listed. Nature Education Department, Oglebay Institute, Wheeling, West Virginia.

Wisconsin:

"Field Check-List of Birds of Wisconsin." 3 cents each; 25 cents for ten; \$1.00 for 50. Also, "Wisconsin Birds: A Checklist with Migration Charts."

35 cents each; \$1.00 for three. Order both from Wisconsin Society for Ornithology, Supply Department, Harold G. Kuse, Hickory Hill Farm, Loganville, Wisconsin.

"Check List of Birds of Crex Meadows Wildlife Area." Free. Send your stamped, self-addressed envelope to Secretary, Burnett County Audubon Society, Grantsburg, Wisconsin.

"Birds of the Horicon National Wildlife Refuge." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

Wisconsin-Iowa-Minnesota-Illinois:

"Birds of the Upper Mississippi River Wild Life and Fish Refuge." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

Wyoming:

"Birds of Hutton Lake National Wildlife Refuge," and "Birds of the National Elk Refuge." Free leaflets. U. S. Fish and Wildlife Service, Washington 25, D. C.

National Wildlife Refuges:

"Publications on the National Wildlife Refuges—1960." Free leaflet. U. S. Fish and Wildlife Service, Washington 25, D. C.

National Parks:

"Check List of the Birds of the National Parks." Issued December 1937 by the Wildlife Division, National Park

Service, Washington 25, D. C. Bound, mimeographed leaflets of check-lists of birds for each of 23 national parks. These old check-lists apparently are not available, or are out of print, but the Chief Naturalist of the National Park Service advises us that "a number of the parks have prepared more recent check-lists on the birds of their individual areas."

CENTRAL AMERICA

Guatemala:

"Birds of Tikal: A Check-List." (In English.) 75 cents each. Order from Frank B. Smithe, 645 West 44th Street, New York 36, New York.

WEST INDIES

Puerto Rico:

"Check-List of the Birds of Puerto Rico." Free. Also, "A Field Guide to the Birds of Puerto Rico: A Supplement to Roger Tory Peterson's Field Guide to the Birds," \$2.00 a copy. For both of these write to Dr. James McCandless, Calle Post Esquina El Bosque, Mayaguez, Puerto Rico.

EUROPE


Great Britain:

"B.T.O. (British Trust for Ornithology) Field List of Birds." No price listed. Write to The British Trust for Ornithology, 2 King Edward Street, Oxford, England.

NOTE TO READERS

Please do NOT order the individual check-lists, given here by states and provinces, from the National Audubon Society. We do not have the local check-lists herein listed. Please order them direct from the sources given in "Avail-

able Field Check-lists of Birds—Canada and the United States." Reprints only of the article, "Available Field Check-lists of Birds," are available from the Service Department of the National Audubon Society at 25¢ each.—THE EDITOR



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